LINGUISTIC AND SOCIAL DEVELOPMENT IN PRESCHOOL DEAF CHILDREN

A study of the factors influencing social, intellectual and linguistic growth during the preschool years

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ABSTRACT

A longitudinal study was conducted of 153 children between three and seven years of age with severe and profound hearing losses. The children came from all programs serving this population in Ontario. Each child was tested three times over a four year period. The test battery included:

1. **Linguistic Measures**

   a. **Speech** reception and production;

   b. Receptive language **comprehension**: comprehension of English grammar whether expressed in speech, simultaneous method (speech plus sign), or Visible English (speech plus fingerspelling);

   c. Mother-child **communication**: expressive and receptive abilities in whatever method or combination of methods was used spontaneously by mothers and children.

2. **Academic Performance**

   a. **Reading** performance at exit from the study;

   b. **Mathematics** performance at exit from the study;

   c. **Social Development**: an assessment of the child's personal and social development on twelve subscales.

In addition, information was collected on the background characteristics of each child through testing and extensive parent interviews.

Major Findings

A study of the sample showed that there were initial differences among children in the various programs. In general, children in auditory programs had more residual hearing, were above average in intelligence, and came from families with higher socio-economic status. Children in total communication programs had less hearing, lower intelligence, and lower socio-economic status. Children in auditory/oral programs were intermediate on these dimensions. These findings suggest that each type of program is better suited for some children than for others.

The analyses of the data support this suggestion. Three measures consistently and strongly predicted the level of development. They were age, unaided hearing loss, and intelligence. Educational factors were much less important and operated within the constraints imposed by these background characteristics. The effects of various factors are briefly summarized as follows.

Age

Age had a significant effect on almost all measures of development except for the speech measures which did not always show consistent growth with age.

Hearing Loss

Level of hearing had a large and consistent effect on all measures of language. Children with severe losses performed better than those with profound losses. Children in the profound category whose losses were 100 db or less did better than those whose losses exceeded 100 db.

Intelligence

Children who were above average in intelligence consistently did better in speech and receptive language. Intelligence was less important for mother-child communication and social development.

Communication Mode

Language development was affected by the mode of communication, but the effect was different for different areas of language. Auditorily trained children generally had the highest scores in speech, followed by auditory/oral children and, finally, by children in total communication programs. In receptive language, however, T.C. children did best, followed by auditory and auditory/oral children. T.C. children also did better on communication measures taken during mother-child interactions and in social development in the early years -- an advantage that was not maintained throughout the study.

Type of Hearing-Impaired Program

There were two types of programs studied: those in which children were trained individually -- home visiting, hospital, and itinerant programs -- and group programs, in which children were placed in segregated classes. Like the effect of communication mode, the effect of type of program depended on the skill being measured. Children in individual programs did better on several of the speech measures. On receptive language and mother-child communication, on the other hand, auditory and auditory/oral children did better in individual programs, while total communication children did better in group programs.

Age of First Program

The average age for beginning instruction was 18 months, and 95 per cent of the children began their training before 3 1/2 years of age. Thus all of the children began relatively early. The data did not show an advantage for beginning instruction before 18 months. In fact, on some measures, children beginning later than 18 months did better. The effects were small however, and were not consistent across years or measures. Moreover, they may have occurred because the children who began instruction later were higher functioning and thus were detected later.

Parent Training

Almost all parents tried to help their children with language development. Some worked informally, while others provided formal, structured language lessons under the guidance of a trained professional. There was some evidence that formal instruction was valuable, but the evidence was not as strong or as consistent as might be expected. The value of formal parent training depended on a number of other factors, including communication mode and hearing loss. In general, parent training appeared to be an important component of auditory and auditory/oral programs and was helpful to children with profound losses.

Integration

Despite the rising interest among parents and educators in integrating deaf children into regular schools, the data showed little difference between children who were integrated and those who were not. The failure to find differences in social development was particularily striking since it is in this area that many proponents of integration predict the greatest impact should occur.

Summary and Conclusions

The results of the present study show that severely or profoundly deaf children as a group do not appear to be significantly impaired intellectually or academically by their hearing loss. They are, however, severely impaired in all phases of their linguistic development which, according to the present results, is heavily dependent on age, degree of hearing loss, and intelligence. Communication mode, type of educational program, age of beginning training and formal parent instruction also influence development. Their effect, however, depends on the characteristics of the child and the areas of development being considered. This means that there is no single answer to the education of deaf children. Programs must be tailored to the needs of individual children and their families.

Chapter 1
BACKGROUND AND OVERVIEW OF THE PROJECT

When we submitted our proposal for this study to the Ministry of Education in 1977, we noted that the literature on the education of the deaf tended to be based more on rhetoric and emotion than on fact. Opposing camps lined up on one side or another of the issue of communication methodology, each advocating its approach without a sound basis in research. One side insisted that deaf education should emphasize speech and the integration of hearing-impaired children into the hearing community. The other side argued that depriving deaf children of a manual augmentative to speech denied them access to educational and social learning opportunities. Moreover, it was said, withholding alternative communication systems caused irreversible damage during the critical period of language development.

Since that time, there has been a gradual change in the education of deaf children in Ontario. The number of auditory/oral programs has decreased, and there has been an increase in programs incorporating manual systems of communication. The change in Ontario programs followed a similar move in the United States, where, since 1968, over half of the preschool programs have switched to simultaneous methods of communication (Jordon, Gustason and Rosen, 1979). At the same time Ontario has seen an increase in the number of children trained in the hospital-based auditory programs. In spite of these dramatic changes, little literature has appeared to clarify the basic controversies. Arnold (1984), for example, charges that neither oralists nor advocates of total communication have conducted research to substantiate their claims.

In 1976 Paula Menyuk identified four priorities for future research. The first was to study the cognitive and linguistic development of young hearing-impaired children, not to determine whether cognition precedes language or vice versa, but to describe the relationship between the two in the development of the child. Menyuk's second challenge was to describe the establishment of communicative systems in young children. As Menyuk stated, "The need for observing communicative interactional patterns between profoundly hearing-impaired children and mothers is clear." Third, Menyuk called for detailed examination of the perception and production of speech-sound distinctions in hearing-impaired children. Finally, she noted the paucity of knowledge concerning language and educability -- the effect of early language and its variations on later language acquisition and educational achievements.

Menyuk's call to the research community has largely gone unheard. Yet, without the

information she specified, educational decisions cannot be made objectively. Policy makers are forced to make decisions about the relative benefits of programs, school boards must allocate funds and resources, parents must choose one program over another -- all without a comprehensive research base to provide clear direction.

Of the studies that have been done, most have focused on specific aspects of development in small samples of children from particular programs. For example, studies have compared small groups of children from different programs on comprehension without considering expressive skills, or on speech intelligibility without communicative intent, or on language but not its academic correlates.

It was our purpose to address Menyuk's priorities by designing an intensive study of the performance of a large sample of hearing-impaired students on a broad range of measures. We felt that, in order to meet these goals, the study should incorporate the following features:

1. Measurement of three important aspects of development: these are language competence in whatever modality children use, academic competence in both high and low linguistic areas, and social adjustment;

2. Evaluation focusing on the preschool period: this is important because the child's early language experience is likely to have a great influence on subsequent development;

3. Longitudinal evaluation: in the few longitudinal studies that have been conducted, results changed from year to year, and the overall pattern became clear only when the data from several years could be considered together;

4. Inclusion of home environment variables: these are probably as important as what happens in school and need to be part of a comprehensive study;

5. Separate consideration of hearing-impaired children with hearing-impaired parents: research indicates that their development is somewhat different from that of children with hearing parents;

6. Evaluation of curriculum variables and program content as well as communication mode;

7. Objectivity: it is important that the evaluators not be affiliated with any particular approach or program, in order to maximize objectivity in their assessments.

In January 1978, we began a five-year study in which 153 severely and profoundly deaf preschool children between the ages of three and seven years from across the Province of Ontario were followed longitudinally. The development of this group was studied intensively in a number of areas: general intellectual abilities; receptive and expressive communication; the emergence of self help skills, social relationships, and social comprehension; and, when the children reached school age, reading and mathematics skills. In addition, we obtained a detailed family history -- including the circumstances surrounding the family's discovery of

their child's deafness and how the family dealt with the problems of raising a hearing-impaired child -- as well as a complete educational history of the child.

One important activity of the first year was assembling an advisory board. The advisory board met with the research team in the developmental phase of the project to assist in establishing basic directions and approaches for the study. The board continued to meet regularly with the team throughout the study in order to monitor the research as well as to provide advice and administrative assistance.

In this report, we will describe the patterns that emerged from the data obtained. The central component of the report is a description of the milestones that deaf children pass in their linguistic and social development. We will look at some of the general factors influencing the rate of development, including the child's overall level of intellectual ability, the type and severity of hearing loss, and some characteristics of the family.

A critical aspect of the study is an examination of the effect of the child's educational experiences on development. We will examine how education interacts with the general variables of hearing loss, intelligence, and family background, in order to determine which educational approaches are most effective with various groups of children.

The population of deaf children from which we drew our sample included all of the children in the Province of Ontario who had a severe or profound hearing loss (i.e., with pure tone average hearing levels of 70 db or higher [ANSI, 1969]) and who were three, four, or five years of age as of September 1, 1978. The data collection began in the fall of 1978 and continued yearly until the spring of 1983.

The first task of the study was to locate every child in the province who fit this description. We identified about 240 potential candidates. The families of these children were approached and their participation requested.

Participation involved the child being tested repeatedly over the four-year period of the study and the parent being interviewed and videotaped each year. Given these demands, we were surprisingly successful in obtaining parental co-operation. Eighty per cent of those approached agreed to participate. A number of children were subsequently eliminated because they did not meet the criteria for inclusion.

The starting sample comprised 161 children. During the period of the study, a few children moved away and several parents withdrew their participation. Most children, however, remained in the study, and the final sample was 153.

During the same start-up period, all programs providing services to hearing-impaired children were contacted and invited to participate. All programs readily agreed, and all remained in the study until its conclusion.

Measures were developed and field tested during the winter, spring, and summer of 1978. By the fall of 1978, most measures had been developed, and consent obtained from families and programs. Data collection began at this time.

The major part of the data collection was carried out by three research officers attached to the project. Two of the three were trained teachers of the deaf and were fluent in sign language. The third was the hearing daughter of deaf parents, who had signed since infancy and was fluent in both manual English and local forms of American Sign Language (Ameslan or ASL).

Data collection was conducted during the four-year period from September 1978 through the Spring of 1983. During that time, three complete rounds of data were collected on each child. Each round consisted of a parent interview (usually with the mother); a receptive language test (LAB); a videotape of the interaction between mother and child, which yielded a number of communication scores; a measure of the child's social development; and a full audiological assessment.

In each round, we attempted to collect the data as close to the child's birthday as possible. In addition to the measures collected repeatedly over the course of the study, a number of measures were collected once. These included measures of intelligence (Leiter scores at entry into the study and WISC-R's at exit), measures of speech reception and production, and tests of reading and arithmetic ability. Information was also collected on the structure and operation of the educational programs in which the children were enrolled.

The first part of this report describes the background and design of the research (chapters 2 and 3). Chapter 4 is a detailed description of the educational programs that were studied. Chapter 5 describes the children themselves and their educational history. The developmental data are presented in chapters 6, 7, and 8. For each measure, we first describe the general level and development of the children and then analyse the factors influencing development in that area. Chapter 9 describes the development of deaf children with deaf parents. Chapter 10 presents parents' evaluations of the educational services in Ontario and their recommendations for change. Chapter 11 summarizes the findings and discusses their implications for educational programming. Chapter 11 is designed to stand alone; readers who are not interested in the entire report may first of all read chapter 11 and then go back to particular sections that they wish to study in detail.

Chapter 2
LITERATURE REVIEW

In evaluating educational programs for deaf children, it is necessary to consider three separate areas of development. One is children's receptive and expressive competence in English, in whatever communication mode they have been trained. The second is children's academic development, both in high language subjects such as reading and low language subjects such as number concepts and arithmetic. The third is children's social and personal adjustment. We shall discuss the literature related to each of these areas. We shall also discuss research on the effectiveness of preschool programming in general and the effects of home background on children's achievement.

2.1. COMMUNICATION AND LANGUAGE

In a very early study, Johnson (1948) compared the academic achievement and communication abilities of manually, orally, and acoustically trained children enrolled in the same school.[1] At school entry children had been selected for either acoustic or oral training on the basis of their degree of residual hearing. Children who, after several years, had not made satisfactory progress in the oral program were transferred to the manual department. Given this selection procedure, it is not surprising that the acoustic group had higher receptive scores in its method of communication than the other two groups had in theirs. In other words, the acoustic group scored higher in reception of speech than the oral group did in reception of lipreading and the manual group did in reception of signs and fingerspelling.

It is difficult to draw unambiguous conclusions from these data, because of the initial differences among the three groups. In particular, the acoustic group would probably have outperformed the others regardless of the training they received, since they started out with a greater degree of residual hearing. This study does not answer the question of whether the oral group would have done better in a manual class.

More recently, Vernon and Koh (1970) summarized eight studies that compared children exposed to manual or combined oral/manual communication in the preschool years with those who received only oral training. In all of these studies, the manual group equalled

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[1] Throughout this review of the literature, the terminology employed by each author will be used. In chapter 4, we will briefly discuss the definitions of terms related to communication methods and present the definitions adopted for the present study.

or surpassed the oral group in speech and speechreading skills. In addition, manual groups consistently excelled in reading, writing, other measures of educational achievement, and psycho-social adjustment. In all but one study, however, children in the manual groups had deaf parents and were thus deaf from genetic causes. Children in the oral-only groups had hearing parents, and in many cases their deafness would have been of exogenous origin. Because there were many possible differences between these two groups, the superiority of the manual groups cannot be attributed unequivocally to their communication modes.

In the same article, Vernon and Koh reported on one study in which all children in both the manually and orally trained groups were deaf from genetic causes. Results again favoured the manual group. This finding is especially striking because the oral group had preschool training and the manual group did not. Children in the manual group, however, did have deaf parents. This study suggests that differences in the achievement of children from deaf and hearing families are not due to differences in the causes of deafness. It leaves open the possibility that the greater success of children from deaf families may be due to factors other than mode of communication -- for example, greater acceptance of the deaf child by deaf parents.

A study by Quigley (1969) compared oral/manual and oral groups to which deaf children had been randomly assigned. The study was longitudinal, with children assessed at several points in time. These data have less possibility of being contaminated by sample bias than the findings already discussed, yet they too show a superiority for the oral/manual group in written language, speechreading, and general academic achievement. It is significant that the oral/manual group outperformed the oral group even though the oral/manual teachers were new to the method and presumably less skilled than their oral counterparts.

The only broadly based, longitudinal study of preschool hearing-impaired children was conducted by Moores, Weiss, and Goodwin (1978). Moores and his colleagues investigated the expressive and receptive communication skills of the children in seven different preschool programs, as well as their academic achievement, cognitive functioning, and psycholinguistic ability. Moores also described the content and structure of each program and the nature of communication within the classrooms.

Moores found that the hearing-impaired children in the study were generally developing cognitive and academic skills to the level of their hearing peers. On the basis of other research, however, he hypothesized that their development would shortly begin to plateau.

Results also showed that programs with a strong cognitive-academic emphasis were superior to traditional preschool programs in developing cognitive and linguistic skills. This was true regardless of the mode of communication used. Overall, combined oral/manual communication was more effective than speech alone for fostering receptive language development, although no differences were found between total communication (speech plus

signs) and the Rochester method (speech plus fingerspelling). The least effective program was one using the acoupedic, or auditory, method. This program, however, emphasized socialization rather than cognitive and language development. The lower performance of the children in these areas, therefore, cannot be attributed solely to their communication mode.

There were no differences in speech or hearing skills associated with the different communication modes. Differences in performance were determined by the emphasis placed on speech and hearing within particular programs, regardless of the communication mode employed. Moores concluded that most of the programs failed to devote sufficient time to training residual hearing and underemphasized such academic skills as computation.

The authors concluded that deafness per se had little effect on intellectual development. Children who did not receive adequate cognitive-academic training however, and whose early communication did not include a manual component were behind those who did receive such training.

The weight of the evidence we have cited seems to favour manual methods over traditional oral training, at least for some aspects of receptive and expressive language development. Imperfect as many studies are, their findings are consistent enough to make it difficult to discount them as a group.

The question remains, however, as to which of the manual methods is best. All of the studies reviewed by Vernon and Koh compared sign language or fingerspelling to oral training. None compared the two manual modes to each other or distinguished between Ameslan and variants of manual English.

The study by Johnson referred to earlier provides some evidence on this question. Johnson found that both manually and orally trained groups benefited from the addition of fingerspelling, as did a group that had received a totally auditory program.

Klopping (1972) criticized Johnson's study on methodological grounds, arguing that there was a major flaw in the measurement of receptive language. Johnson had required students to write the exact words in a set of sentences delivered by the various methods. Klopping argued that, because fingerspelling corresponds more directly to written English, it was possible for students to transcribe what was said without comprehending the meaning. Klopping constructed what he felt was a more valid comprehension test. His test required students to paraphrase a story and answer multiple-choice questions on its content. His results showed that communication scores were highest for total communication (signing plus fingerspelling plus oral), followed by the Rochester method (fingerspelling plus oral) and finally by oral-only presentation.

Moores and his group, in the study mentioned earlier, also found that the highest level of comprehension occurred during combined presentations (sound, speechreading, plus signs). In the later years of the study, children taught to use fingerspelling comprehended

fingerspelling as well as children taught to use signs comprehended signs, although the former were behind initially.

In a recent, carefully conducted study, Greenberg (1980) examined the communicative competence of 25 deaf preschoolers by recording spontaneous interactions with their mothers. Greenberg's study avoided one of the methodological problems which had marred earlier research. Rather than preassigning children to a single communication group, Greenberg measured the amount of each type of communication. He was then able to measure the communicative competence of each child and determine the effectiveness of each method.

The results indicated that children whose mothers used bimodal and simultaneous communication (i.e., speech accompanied by gesture, sign, or fingerspelling) had higher communication skills. This was true for both orally trained children and for those trained in simultaneous methods. The results also showed that the choice of unimodal or bimodal communication depended on the function of the message and the child's communicative ability in a particular task. Thus, mothers and children were selective in mode use.

Greenberg concluded that both oral and T.C. (total communication) children communicated more effectively with the addition of manual information. In both T.C. and oral groups, the best communicators were found to make frequent use of gestures, signs and/or fingerspelling. Children with the highest communication scores in the oral group used more natural gestures than oral children with lower scores. Similarly, T.C. children with the highest communication scores used more signs and fingerspelling than children with lower scores, although the high scorers better synchronized the manual component with speech. A further finding was that mothers of highly competent T.C. children used signs in combination with speech, rather than signs alone. This was less true of mothers of less competent children.

Greenberg's study provides strong evidence of the value of manual communication. It shows that some deaf children function well orally but that even these make frequent use of manual information.

2.2. ACADEMIC ACHIEVEMENT

Johnson's early study (1948) showed that the acoustic group had the highest level of academic achievement, followed by the oral group and then the manual group. Recall, however, that this sample was so biased by selection that serious doubt is cast on any conclusions.

In a more recent study, Chasen and Zuckerman (1976) found that students in total communication classes had higher academic achievement and communication skills than orally trained students.

Brasel and Quigley (1977) found that children of deaf parents who used manual English were superior on academic and English language tests to children of deaf parents who used Ameslan. This result is difficult to interpret, because the manual English group also had higher IQs and came from families with higher socio-economic status. Superior performance, therefore, cannot be attributed solely to communication mode. Both groups of children with deaf parents, however, surpassed orally trained children of hearing parents -- even those who had been in intensive oral programs that included parent training.

This study suggests that programs incorporating some form of manual communication have an advantage over purely oral programs in fostering academic development. It also suggests that the best communication system is the one that most closely corresponds to English.

As we noted in the preceeding section, Moores found that differences in academic achievement were related only to the academic emphasis in the programs he investigated. There were no differences attributable to communication mode.

Thus, the findings related to academic achievement are not consistent, although some of the studies found that manual communication was better than oral-only.

2.3. THE EFFECTIVENESS OF PRESCHOOL PROGRAMS

Because of the focus on teaching language, preschool programs designed for culturally disadvantaged children share some characteristics with those for deaf children. Although there has been little research on the impact of preschool education on the later academic achievement of deaf children, this question has been widely addressed for the culturally disadvantaged.

The initial evaluations of preschool education for culturally disadvantaged groups produced disappointing results. Bronfenbrenner (1974) reviewed eight studies of preschool intervention programs. He concluded that the programs were effective in fostering intellectual and academic achievement but that the gains began to dissipate at the conclusion of the program. Follow-up studies conducted after several years typically showed no remaining effects.

Recent research has produced more encouraging results. A series of longer term studies conducted for periods of up to 15 years indicated that gains re-emerged in the late primary years (e.g. High Scope, 1977). Some types of programs were found to be more successful than others, namely, those with a carefully structured curriculum having a strong cognitive, language, and achievement emphasis. Programs with an emphasis on social development or personal growth were less successful when assessed on academic criteria. This is similar to what Moores and his colleagues found in their study of preschool programs for deaf children.

This finding leads to the not surprising conclusion that programs are most successful in the areas they emphasize (cf. Miezitis, 1971). Cognitive skills and reading achievement are best developed through direct teaching. There is no educational advantage to programs that focus on personal or social readiness for learning.

In his review, Bronfenbrenner also summarized studies on the effectiveness of home-based intervention programs in which parents were trained as teachers. The benefits accruing to children from such programs generally did remain after several years. This persistence probably occurred because home-based programs increased parent teaching skills (Waksman, 1975; Baig, 1976) which the parents continued to use in subsequent years.

In an interesting study of one home-based intervention program, Gray (1971) found that the greatest growth was shown by younger children in the family rather than by the target child. This is evidence that parents can successfully transfer teaching skills and continue to use them over time.

Careful studies of the potential advantages of preschool education for deaf children are almost non-existent. Those that have been attempted (Craig, 1964; Phillips, 1963; Vernon and Koh, 1970) have found no significant and durable academic gains attributable to the preschool experience per se. On the basis of the literature with disadvantaged children, however, it can be expected that preschool programs for the deaf will be most effective in fostering language development and academic achievement if they have well-defined, cognitively oriented goals and are carefully structured to attain them. We would also expect that programs involving parents would be more successful than programs not involving parents, and programs of greater duration and intensity would be more successful than shorter, less intense programs.

2.4. THE EFFECTS OF PARENT AND HOME CHARACTERISTICS

A most stable finding in educational research is that the social background of children is enormously influential in their school success. Jencks (1972) claimed that the correlation between family background and eventual educational attainment is between 0.40 and 0.50. Buttrick (1972) showed that Ontario university entrance is strongly related to family income. The study by Reich, Hambleton, and Houldin (1975) showed that parents' education predicts the success of hard-of-hearing students in integrated settings.

The many factors involved in social background are difficult to disentangle; among them are inherited intelligence, parents' ability to provide educational stimulation, and family economic resources. One factor that has been isolated is the nature of parent-child interaction, and particularly maternal teaching style.

Milner (1951) reported on a study showing that high achieving children in first grade came from homes where there was a high level of verbal interaction between parents and

children. Levenstein (1970) stimulated the cognitive growth of low-income preschoolers by a home visiting program aimed directly at increasing verbal interaction. Research by Hess and his colleagues (Hess and Shipman, 1965; Olim, Hess, and Shipman, 1967) demonstrated that higher socio-economic status mothers showed not only more, but also a different kind of, verbal interaction with their children. Such mothers were good teachers because they were able to use language to structure learning situations in a way that was meaningful to the child and to carefully guide the child through the instructional task. Shipe (1970) has demonstrated the existence of the same interaction differences between families with children who are functionally retarded although there is no organic cause, and similar families with normal children.

These findings have important implications for deaf children, for whom the development of an adequate communication system is the primary difficulty.

Research comparing the development of deaf children with deaf parents and deaf children with hearing parents underscores the contribution of parents to development. The research shows that deaf children of deaf parents achieve higher academic levels, at least equivalent speech skills, and better psychological and social adjustment (Quigley and Frisina, 1961; Stevenson, 1964; Stuckless and Birch, 1966; Meadow, 1968; Vernon and Koh, 1970). Moreover, the evidence suggests that the relative advantage of children with deaf parents increases with age right up to late adolescence.

There is little question about the superiority of deaf children from deaf families, but there is considerable uncertainty about the underlying cause. One possible explanation is that, because deaf children with deaf parents are more likely to have been deafened by genetic factors, they have fewer secondary handicaps that might further impair development. Another possibility is that deaf parents are more accepting and have greater understanding of the handicap and are thus better able to foster the child's development. A third possible explanation is that children with deaf parents have been exposed to a fluent, manual communication system from birth. This explanation is part of the rationale for employing total communication in preschool programs. It is an hypothesis, however, that must be directly verified.

2.5. SOCIAL DEVELOPMENT

There have been few studies of the social development of hearing-impaired children, although many proponents of total communication argue that manual training offers social benefits that purely oral methods do not.

The early review by Vernon and Koh (1970) concluded that manually trained children were superior in psycho-social development to children in the oral group. More recently, Meadow and her colleagues (1981) found that the interaction of T.C. children with their mothers was more like hearing children's than was the interaction of orally trained children.

Social development is an area that has been largely neglected in previous research on hearing-impaired children, although it is of obvious importance. One of the goals of the present study is to further research in this area.

2.6. SUMMARY

Research literature on educational programming for deaf children is inconclusive but suggestive. It first of all suggests that communication methods that include a manual component have advantages over purely oral methods. It also suggests that programs emphasizing direct instruction in academic and language skills are more successful than those with more general goals. Finally, the literature demonstrates the importance of family background and parental involvement, and suggests that there is a need to consider social development when evaluating educational outcomes.

Chapter 3
DESIGN OF THE STUDY

3.1. HISTORY

This study was conducted under contract to the Ontario Ministry of Education. In the fall of 1977, the ministry issued a general call for proposals. A proposal for the study was developed by the team and submitted to the ministry. The contract was awarded in December of 1977 and work began in January 1978.

During the first six months of 1978, work progressed on a number of fronts. One of the first tasks was to conduct a census within the province of deaf children in the age range specified for the study. By April, contact had been made with all known programs for preschool hearing-impaired children, and a preliminary census completed. Contact had also been made with the major hospitals involved in the diagnosis of hearing loss, with public health departments in the north of the province, and with VOICE for Hearing-Impaired Children in order to identify any additional children who might not be involved in educational programs for the deaf.

Also during the spring of 1978, the staff consulted with various individuals and groups about the design of the study. A general presentation was made to the Ontario Speech and Hearing Association in Toronto. Discussions were held with parents' groups in Toronto, Ottawa, Kitchener, Windsor, St. Catharines, Hamilton, and London, Ontario, as well as with parents attending programs at the three provincial schools for the deaf. Presentations were made to staff at the three provincial schools and at eight other schools in the Province. Meetings were held with the Canadian Hearing Society and with members of the Ontario Association of the Deaf.

The process of consultation included other researchers in the field of hearing impairment. In May, Dr. Wilson and Dr. Lindsay visited Gallaudet College and met with Drs. Kay Meadow, Richard Trybus, Michael Karchmer, William Stokoe, and Dennis Cokely. They also visited Dr. Stephen Quigley at the University of Illinois. Subsequent discussions were held with Drs. Donald Moores, Phillip Dale, Sheila White, Jamie McDougall, Carol Irting, Ursula Bellugi, and Roger Freeman. Drs. Philip Dale and Donald Moores visited the project team at OISE to offer advice and suggestions. Two presentations on the study were made at the American Educational Research Association meetings in April of 1981 and 1982, where further comments were received.

Selection and development of measures for the study also began in the spring of 1978. The Language Assessment Battery had previously been developed by the principal investigators to measure the receptive language ability of school-aged deaf children. This work had been conducted under grants from the Ontario Ministry of Education and OISE beginning in 1977. Work quickly began on adapting portions of the test for a preschool population (appendix B). Work also began on selecting and developing the other measures to be used.

The process of consultation and liaison that was begun during the first six months continued throughout the project. From among the groups contacted during the initial phase, a number were invited to send a representative to sit on a permanent advisory board. Invitations to the board were issued in August of 1978 and the first meeting was held in October. The composition and work of the advisory board is described more fully in the next section.

By the fall of 1978, most children eligible for the study had been identified, and the staff began the process of obtaining written parental consent. Generally speaking, permission forms were initially distributed by the schools to eligible families. It was only after parents consented to participate that names, addresses, and phone numbers were made available to the team.

Roughly 80 per cent of the families consented to participate in the study, and almost all of these continued until the end. Details about participation and attrition rates appear in a subsequent chapter.

Interviewing of parents and testing of children began in the fall of 1978. Thus by the end of the first year most of the developmental work had been completed and the study was well underway.

Several developmental tasks continued into subsequent years. After the initial year of data collection, we realized that there were very few of the youngest children in the sample Therefore, in the summer of 1979, an additional group of three-year- olds was identified and added to the study.

The development of measures continued into the spring of 1982 when a special set of tests and interviews was completed for administration during the final round of data collection.

An important part of the study was the collection of descriptive information on the educational programs in which children were enrolled. Development of the teacher interview and classroom observation procedures that were used for this purpose began in January 1979. Information was collected on the major programs in the spring of 1979. The measures were subsequently revised, and a second round of information was collected in the spring of 1980.

The development of measures continued into the spring of 1982 when a special set of tests and interviews was completed for administration during the final round of data collection.

The permission form signed by parents allowed the team to interview families, test children, and obtain medical, audiological, and educational information from school and hospital files. The comprehensive set of information that was collected produced a large data bank that could only be partially analysed during the contract period. Therefore, a second permission form was distributed to parents at the end of the study, requesting permission to continue analysis of the data after the conclusion of the formal ministry study. Almost all parents agreed to this further request.

The original contract called for the study to be completed by December of 1982. A number of factors made it impossible for us to meet that deadline. First, the number of children in the study was larger than planned, extending the task of data collection. There were also more programs providing preschool education than we had originally thought, increasing the time spent in liaison with schools and collection of information about programs. Also, as the result of consultation with members of the advisory board and other researchers, additional measures were added to the study. Finally, the unexpected rate of inflation during those years increased costs to such an extent that our staff had to be reduced, and so the rate of progress was slowed.

Final data collection was not concluded until the spring of 1983. Coding of the data and entry into the computer were completed during the summer, and analysis and writing of the report, in the spring of 1984.

This is a general history of the study. More detailed information on the design and procedures is contained in subsequent sections.

3.2. ADVISORY BOARD

In the first six months, a great deal of time was spent consulting with interested persons and groups about the design of the study. The advisory board was subsequently constituted to provide a forum for continued discussion.

The membership of the board was broadly based and included representatives from various types of organizations serving deaf persons: schools (teachers and administrators), parents' groups, organizations of deaf adults, and social service agencies. Thus, the board represented a range of experience and opinion. Members of the board are listed in table 3.1. Invitations to sit on the board were issued in August of 1978. The first meeting was held in October of that year, with subsequent meetings in January 1979, October 1979, October 1980, November 1981, and November 1982.

Table 3.1

Advisory Board Members

Group	Representative(s)	Dates
Schools for the Deaf		
E.C. Drury	Paul Bartu, Principal, Junior School	1978-82
	Carolyn Edwards, Audiologist	1978-82
	Mary Monette, Sup., Home Visiting Program	1978-82
Robarts	Mike Vita, Sup., Home Visiting Program	1978-82
Sir James Whitney	Peter Kitcher, Audiologist	1978-82
Teacher Education Centre	Bernice Ryan, Principal	1978-82
Boards of Education		
Etobicoke	Kathleen McKinnon, Teacher, Buttonwood Public School	1980-82
Kitchener	Steve Campbell, Principal	1978-79
	Murray McKinnon, Acting Principal	1979-82
	Joanne Potter, Teacher, Smithson PS	1978-82
London	Rhea Stewart, Special Education Consultant	1978-81
Peterborough	Zita Fitzgerald, Teacher, Central PS	1978-81
Scarborough	Mary Buckley, Teacher, Clairlea PS	1978-82
Sudbury	Seyja Mansfield Bailey, Wembley Rd. PS	1978-82
Toronto	Stan Draffin, Co-ordinator Special Programs, Communications	1979-82
	Herb Goldie, Principal Metro Toronto School for the Deaf	1980-82
	Warren Estabrooks, Teacher Metro Toronto School for the Deaf	1980-82
Windsor	Debbie Weeks, Teacher, Victoria, Central PS	1978-80
		1981-82
	Gwen Salter, Teacher, Central PS	1980-81
Hospital Programs		
Chedoke Hospital	Dr. Sandy Eisele, Head of Audiology	1978-81
	John Sasala, Head of Audiology	1981-82
Children's Hospital of Eastern Ontario	Marietta Patterson, Teacher	1978-81
	Judy Simser, Teacher	1978-82
	Dr. Andree Smith, Head of Audiology	1978-82
Hospital for Sick Children	Marilyn Boyden, Head of Audiology	1978-81
Parents' Groups		
Ontario Parents' Council	Doris Chapman	1978
	Anne Gagne	1978
	Cheryl Gibson	1978-80
	Garnet Gow, President	1978-81
	Dr. Ayaz Sheikh, President	1982
VOICE for Hearing-impaired Children	Jules Sampson, Treasurer	1978-79
	John Craig, Chairman	1978-81
	Gary Scattergood, Chairman	1981-82
Other Agencies		
Canadian Hearing Society	Diane Gutierrez, Counsellor	1978-82
	Art Squires, Audiologist	1978-82
Ontario Association of the Deaf	Dorothy Beam, President	1978-82
	Cheryl Osten	1978-82
Canadian Association of the Deaf	Doris McKillip, President	1978-82

The board served a number of functions. It first of all provided a forum in which general issues could be discussed. Both researchers and board members had a number of concerns about the study that were resolved through an interchange of ideas. Initially board discussion focused on the goals of the study and the adequacy of the design to meet those goals. As the study progressed, meetings were used to keep members up to date on developments so that potential problems could be identified.

Members of the board raised a number of specific concerns. One central issue was the confidentiality of the data. In response to this concern, special procedures were developed to ensure that information would not be used inappropriately. The board was also interested in the feedback of information to participating families. Through discussions with the board, procedures were developed for providing general information to families about the study as a whole, as well as specific feedback on their own child's performance. Other issues arose throughout the course of the study and were addressed through the mechanism of the board.

The board also provided a pool of experts on which the team could draw for help in specific areas. An audiology subgroup was established to help develop a set of audiological measures. A subgroup of teachers helped develop a measure of speech reception and production and the classroom observation system. A subgroup of deaf adults provided suggestions for the final interview of deaf parents. The board played an important role in disseminating information about the study to the community as a whole. Individual members provided liaison with their particular agency or group. Several members placed articles about the study in agency publications. On the board's advice, the team instituted a project newsletter that went through several issues and was distributed to parents and program staff. Information packets on various aspects of the study were also developed and made available to interested persons.

The board served an important administrative function throughout the study. Members not only advised the team on administrative matters but also helped arrange access and schedule visits to their agencies' programs.

Finally, plans were developed with the board for disseminating the results of the study to participants -- plans that will be implemented with the board's continued help.

3.3. DESIGN

This project was an evaluation study, the goal of which was to improve educational practice in Ontario. Thus, the study was an example of applied research, whose audience extends outside the scientific community to include professional and other client groups (Caro, 1971).

Most evaluation studies address the question, Which program is best? The question to which this study was directed, however, was, Which program is best for which type of child?

Thus, the study sought to discover possible aptitude-by-treatment interactions. All evaluation studies are concerned with variability in development and require large samples. They also require the use of statistical techniques that can detect consistent differences against a background of random variation. The concern of this study with child-by-program interaction made sample size even more critical.

The sample was designed to include all children between the ages of three and seven years who had a severe or profound hearing loss and who were served by programs for the hearing impaired. All children meeting these criteria were included, regardless of the presence of additional handicaps. Thus, the study focused not on a particular type of child but on the population actually served by programs in Ontario. To our knowledge, it is the largest study ever done on a preschool hearing-impaired population.

The study used a time-lag design with four cohorts of children (Goulet, 1975). Data were first collected on children when they were three, four, or five years of age and again in two subsequent years. It had initially been planned to test children over four years; however, time and financial constraints made this impossible and the design was revised so that children were tested in only three years. In some cases, tests were separated by two years rather than one, providing test information over a four- year period for these children. Thus, the study yielded quasi-longitudinal information on children between the ages of three and seven years. There were a total of 153 children in the study on whom relatively complete sets of data were obtained. Table 3.2 outlines the design. More detailed information on children in the sample is included in chapter 5.[2]

The data collected fall into three general categories (see table 3.3). There is first of all a set of background characteristics. These are factors that are attributes of the children themselves and of their families. They are relatively invariant and represent the resources that children and their families bring to the task of development. Table 3.3 shows background characteristics to include degree of hearing loss, intelligence, socio-economic background of the family, and whether parents are hearing or deaf.

The second set of variables consists of program characteristics. These represent the services that educators offer to facilitate children's development. In this study, they include mode of communication, type of program, degree of integration, parental involvement, age of beginning instruction, and curriculum approach.

The third set of measures, outcome characteristics, is composed of indices of development. This study was concerned with linguistic, social, and academic development.

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[2]Because of the delay in collecting the final round of data, some children were eight or nine years of age by the time they were tested. The exact number of children tested at each age is given in chapter 5.

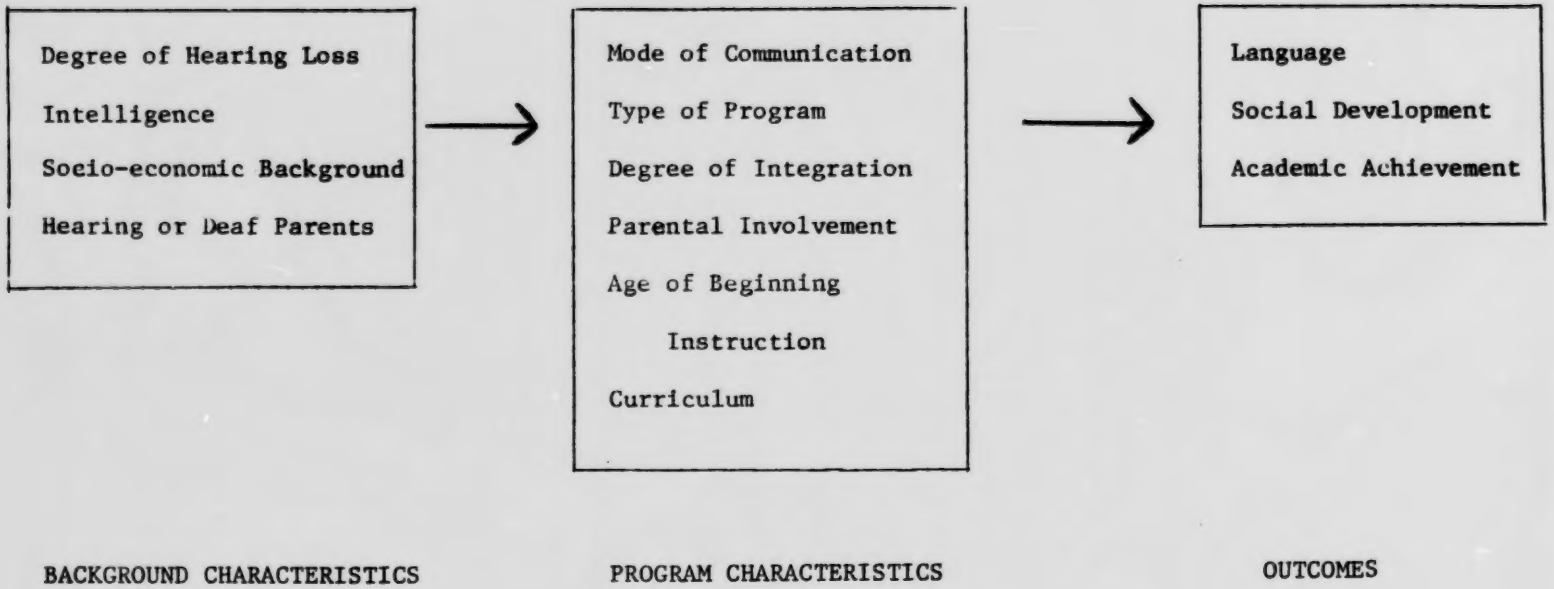
Table 3.2

Sample Design

Cohort #	Year of Entry	Age of Testing					
		3	4	5	6	7	n
1	1978-79	X	X		X		17
2	1978-79		X	X		X	63
3	1978-79			X	X	X	47
4	1979-80	X	X	X			26
n							153

Table 3.3

Study Design



3.4. EDUCATIONAL PROGRAMS

Most evaluation studies suffer from what can be called the "black box" syndrome. Programs are considered to be unitary wholes and are identified by their official label. Thus, in deaf education, we have "auditory" programs and "total communication" programs or "natural" and "structured" language programs, depending on the aspect of education that is chosen for study. Such classic evaluation studies as the Follow-through and Planned Variation Studies (Stebbins et al., 1977; House et al., 1978), however, have found that programs that are supposedly following the same model may vary from site to site or even from time to time. It is also not uncommon to discover a lack of differentiation among programs that are considered to be following different models (Leonard and Lowry, 1979). Thus, the "black box" approach is unrealistic.

Another problem with this approach is that it is unidimensional: it ignores the multiplicity of factors that make up any educational experience. A final problem with this approach is that considerable numbers of subjects are lost due to population mobility, a situation that imperils the representativeness of the results as well as the sample size.

This study attempted to depart from the usual approach, guided, in part, by the work of Donald Moores and his colleagues (1978). Rather than evaluating programs, we attempted to study the outcome of children's educational experience. Our view is that any particular program site must be described on a number of dimensions. The dimensions used in this study are the ones listed in table 3.3. It is important to recognize that the same program site may offer different experiences to different children. Children thus accumulate a unique combination of educational experiences as they progress from year to year and move from program to program. This study, therefore, focused on children and their development rather than on programs per se.

Although we were not totally successful, the study did go a long way towards achieving this goal. As a result, the findings are very meaningful and generalizable.

The study used a quasi-experimental design in which natural selection, rather than random assignment, determined the allocation of children to programs. Furthermore, the study collected data on programs, so that the effect of actual practice, rather than stated program philosophy, could be evaluated. An important part of the report is chapter 4, which presents a detailed description of the programs, using the program dimensions outlined in table 3.3.

The study included almost 40 programs providing service to hearing-impaired preschoolers. About 20 of the programs represented major, ongoing educational settings for the hearing-impaired. The remainder were primarily itinerant services offered by boards of education to only one or two children within the age range of the study. The programs spanned the entire early educational period from infancy to Grade 1 and, in a few cases, Grade 2.

The major programs were initially contacted and asked to participate in April of 1978. Many programs received a site visit at that time. Other programs were contacted later in the study as children moved into those settings.

All programs in which sample children were enrolled readily agreed to participate in the study and continued their participation as long as it was required. A list of participating programs appears in the next chapter as table 4.1.

3.5. AUDIOLOGICAL ASSESSMENT

Children selected for inclusion in the study had a hearing level of 70 db or more in the better ear as measured by the average of responses to pure tones at 500, 1000, and 2000 Hz (ANSI, 1969). Pure tone average (PTA) was the basic audiological measure used in the study. It served as both a sampling criterion and a background characteristic against which children's progress was assessed.

PTA was obtained on all children in the study. In addition, a number of other measures were collected if available. The measures to be collected were selected in consultation with the audiological subgroup of the advisory board. They are measures that the subgroup felt it is desirable to obtain on preschool children -- measures that audiologists serving the population were encouraged to include in their test batteries. It was not possible however, to obtain these measures on every child.

The suggested measures and procedures for obtaining them are briefly described below:

1. Pure tone average (PTA): the threshold for detection of sound;

    a. Pure tone thresholds should be obtained for each ear under headphones at 250, 500, 1000, 2000, and 4000 Hz.

    b. If there is a greater than 20 db drop across any octave, test at the mid-octave range.

    c. If unaided testing cannot be done under headphones, sound field testing should be substituted. For this purpose, warble tones are preferred over narrow band noise, if available.

    d. Bone conduction tests should be done at least once on every child as early as possible or any time there is a significant shift (5 db) in air conduction thresholds.

    e. Aided tests should be done in sound field using warble tones, if available.

2. Speech awareness thresholds: the threshold for detection of speech;

    a. Use live voice presentation, monaurally under headphones.

b. The stimulus materials should be nonsense syllables, augmented where appropriate by words selected as familiar to the child or by spondee words.

c. Aided tests should be done in similar fashion in sound field.

3. Speech reception threshold (SRT): the threshold for 50% recognition of spondee words;

a. Use live voice presentation.

b. Use the standard spondaic word list, choosing words that the child knows. Test only if the child knows at least three or four words.

c. Test reception by having the child select an appropriate picture or object, or by repeating the word, if appropriate.

d. Test the child both aided and unaided, monaurally and binaurally.

4. Speech discrimination (SD): the degree of word recognition at levels well above threshold;

a. Use unaided,live, monaural presentation under headphones.

b. Use a standard test such as the WIPI or PDK. Note the test used.

Because of the limited language capabilities of most of the children and practical limitations of testing, very few SRTs and SD scores were obtained.

3.6. INTELLECTUAL ASSESSMENT

Intelligence was included in the study as a major background characteristic against which the progress of children was measured. Selecting an appropriate instrument for the study was difficult because of the young age of the children and their limited language ability. Instruments had to be found that covered the required age range. Instruments also had to be nonverbal, so that the assessment of intellectual abilities would not be confounded with communication skill.

The Leiter International Performance Scale was chosen to be administered to children in the first year of their participation in the study (Leiter, 1969). The Leiter uses a simple matching task with stimuli of increasing complexity to assess the child's ability to conceptualize and abstract. The task was easily taught to even the youngest children in the study; it was appealing and held their interest.

Arthur (1952) created an adaptation of the Leiter scale for deaf children. The adaptation uses simplified instructions and a modified scoring system and is normed on deaf children. The Arthur adaptation was used in the present study.

Although one of the few instruments that can be used with young deaf children, the Leiter scale is limited in its approach to the measurement of intelligence. A much more comprehensive instrument is the performance scale of the WISC-R test (1975). This test includes a wider range of tasks, thus giving a more valid assessment of overall intellectual ability. It is also better normed. The WISC-R cannot, however, be used with children under six years of age.

It was decided, therefore, to administer the WISC-R as an additional measure of intelligence to all children in the last year of their participation in the study. Steven Ray (1974) has adapted the WISC-R for deaf children, and his procedures were followed. Children who were five years of age in the last year, or who were believed to be functioning significantly below age level, were administered the WPPSI test, which is a downward extension of the WISC-R to younger age groups (Sattler, 1982).

3.7. LANGUAGE ASSESSMENT: SOME CURRENT ISSUES

Language assessment has changed dramatically in the past ten years (Launer and Lahey, 1981). Increased understanding of the complexity of language and the way in which it develops has revolutionized the field. Prior to the 1970s, language assessment was concerned mainly with linguistic structure or form. This concern was reflected in assessment procedures that focused primarily on articulation and syntax. In the 1980s, however, assessment is viewed as also requiring analysis of the content of the message and the speaker's ability to use language in natural situations (Bloom and Lahey, 1978). These are the areas of semantics and pragmatics, which capture the creative and dynamic aspects of language.

John Muma (1978, p. 212), in a widely used text on assessment and intervention practices, asserts that much language assessment has been characterized by the "single sample fallacy". This is the belief that language development can be assessed by a single test or measure. Experts in the field now agree that valid assessment requires the use of a variety of measures. Assessment should tap the various levels of language -- phonology, semantics, syntax, and so on -- should test both receptive and expressive skills, and should assess the use of language in a variety of situations, natural as well as clinical.

Educators and researchers working with deaf children take a similar view (e.g., Brennan, 1975; Kretschmer and Kretschmer, 1978). Assessment of the language of deaf children must, in addition, allow for different language modes such as speech, manual English, and Ameslan.

The present study attempted to be comprehensive in its approach to language assessment within the constraints imposed by time, money, and the need to obtain quantifiable measures in order to compare individuals and groups.

Table 3.4 outlines the measures used. The table defines two critical dimensions. One dimension is channel - receptive versus expressive language. The other dimension is language mode. In the speech mode, assessment focused on spoken English. The measures used tap phonology, semantics, and syntax. At the language level, the LAB test was used to assess children's comprehension of English vocabulary and syntactic structure, whether represented orally or manually. At the level of communication, the relatively natural interaction between mother and child was used to assess the child's general communication ability, regardless of whether linguistic or non-linguistic systems were used.[3]

Each level of assessment is progressively more inclusive and more closely approximates language use in a natural setting. The speech level tapped only spoken English; both spoken and manual English were included at the language level; and the communication level included English and ASL, as well as natural and idiosyncratic gestural systems.

3.8. SPEECH PRODUCTION AND RECEPTION

A number of measures were used to assess the children's speech capabilities. The measures tap both receptive and expressive skills and cover the phonological, semantic, and syntactic levels of spoken English. There are three tests that spanned the performance range of the children in the study.

Prior to administration of the measures, each child's aid was checked to ensure that it was in good working order. The type of aid used and the acoustic conditions of the room were also noted.

The three tests, in approximate order of difficulty, are briefly described below. A detailed description of each measure is given in appendix A.

3.8.1. Production of Words in Isolation (WORDS)

This test assesses basic speech production abilities by showing children pictures and asking them to name the objects. Following the "spontaneous" naming of each object, the tester names the object and the child "imitates" the label. This test was tape-recorded and later scored for the number of words produced "intelligibly" and "perfectly" under each of the "spontaneous" and "imitation" conditions.

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[3] A sample of spontaneous language was also obtained from the child as part of the mother-child interaction. We intended to analyse the sample to assess the child's expressive language. It has not yet been possible, however, to complete this part of the analysis.

Table 3.4

Language Assessment Strategy

Mode	Channel: Receptive	Channel: Expressive
Speech	Speech Reception Test	Production of Words in Isolation Connected Speech Test
Language	LAB	Spontaneous Language Sample
Communication	Receptive Communication Tasks	Vocabulary Measure

Mother-Child Interaction

3.8.2. Speech Reception (ACLC)

This test measures the child's ability to comprehend simple spoken phrases. It uses the 12-item short form of the Assessment of Children's Language Comprehension test by Foster, Giddan, and Stark (1973). The items in this test are of varying difficulty, including either two, three or four critical elements. The phrases include basic semantic relations and require little syntactic knowledge.

Items in this test were presented with the mouth area covered so that the children had to rely on auditory cues alone. Each item was accompanied by a plate of four pictures. Following presentation of the stimulus, the child pointed to the picture that best represented the phrase. A child's score on this section was the number of items correct.[4]

3.8.3. Connected Speech

A sample of spontaneous connected speech was obtained from each child using picture story cards. Children with limited speech and/or language skills could respond by simply labelling objects in the pictures, while children with more developed skills could describe actions or tell a story. Four pictures were shown to each child. Children were asked to "tell a story". Specific questions about the pictures were used only with children who required more prompting.

This test was tape-recorded and later analysed using a modification of Ling's Phonological Level Speech Evaluation (1976).

3.9. RECEPTIVE LANGUAGE ASSESSMENT

The receptive language test was adapted from the Language Assessment Battery (LAB), an instrument originally developed by the authors (Keeton, Lindsay, and Reich, 1980) to determine the receptive language proficiency of school-aged hearing-impaired children. Validation studies (Reich, Keeton and Lindsay, 1978; Keeton, Lindsay and Reich, 1979) have shown LAB to be a simple unidimensional scale of increasing difficulty (i.e., a Guttman scale). For this study, we adapted the version developed for school-aged children by selecting the most representative proposition from each of the 36 syntactic units of the LAB test and adding some simpler items to the beginning of the test.

The sequence of items used in the test is based on the work of Roger Brown (1973), Melissa Bowerman (1975), Laura and Richard Kretschmer(1978), and Quigley and his associates (e.g., Wilbur and Quigley, 1977), who have studied the developmental trends in expressive language acquisition in hearing and deaf children.

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[4] A fourth measure, complex speech reception, was added after one year's use of the speech reception test. The new test was similar to the original, except that the items were more complex. Because the complex measure was not administered to the entire sample, it has not been included in the present analysis.

The major source for the test was the work of Roger Brown. Brown describes children's language acquisition as proceeding through five general stages of increasing difficulty or complexity. The stages were defined on the basis of a conceptual analysis of the language system and empirical data on the order in which various syntactic constructions appear during expressive development. Each of these five stages includes a number of syntactic constructions, which are themselves of varying difficulty.

The test uses an enactive format. The child is presented with propositions from the test and acts out their meaning using a doll's house. Propositions were presented in the child's primary mode of communication -- that is, the mode in which he or she was being taught. The modes used were speech, visible English, and simultaneous method.

Because the primary purpose of the test was to determine knowledge of English syntax, children were tested on the vocabulary items prior to administration of the propositions themselves. Any words missed were trained prior to proceeding with the test.

For purposes of administration, the 36 propositions were divided into three sections that represented increasing levels of complexity. Within each section, too, propositions were ordered by complexity. The relevant vocabulary was tested and trained, if necessary, prior to each section. Each set of vocabulary and each section of propositions had performance criteria that children had to meet in order for testing to continue. Within the test, each proposition was presented twice in the child's primary mode of communication, after which the child was given a chance to demonstrate comprehension of the item by manipulating the toy dolls, food, or furniture in the house. This procedure continued until all items were administered or until a child failed to meet the performance criteria for proceeding to the next section (appendix B).

The vocabulary section of the test was scored for the number of nouns and verbs correct prior to training. Performance on each proposition was scored as showing high (perfect performance), good (missing one minor feature of the proposition), moderate (comprehending the criterial syntactic feature but missing several minor features), or poor comprehension (missing the criterial syntactic feature and several minor features). The vocabulary and proposition scores were weighted and summed to yield an overall index of receptive language abilities. The derivation of the weighting formula is described in the thesis by Woon Teck Leong (1982). Further details of the test construction and reliability estimates appear in appendix B.

3.10. MOTHER-CHILD COMMUNICATION

The study assessed communication between mothers and children in order to tap linguistic skills in a more natural environment. Children's ability to actually use language is the goal of all language teaching. During the preschool years, communication within the family is critical to the social and emotional development of the child. Thus, the study was concerned with the pragmatic as well as the strictly structural aspects of communication.

The general approach taken in this research was similar to the one used by Meadow and her colleagues (1981) in their study of young deaf children. The procedures included both *structured* and *unstructured* opportunities for communication. The structured tasks were variations of the communication games originated by Glucksberg and Krauss (1967) to study development in hearing children. Communication games require one partner to communicate information to another. Speakers may communicate freely, using whatever linguistic structures they choose, adapting the message to the needs of the listener.

In adapting communication tasks to deaf children, the use of any mode of communication was allowed. In fact, one of the purposes of the assessment was to observe what modalities mothers and children actually used when there were no constraints on their behaviour. The focus of the measure was on successful communication, not language per se.

Opportunities for unstructured interaction were also provided, in the form of book reading and free play. These unstructured interactions were later observed to note the modes of communication used by the mother and child. They will later be transcribed and scored to assess the child's expressive language. It was not possible, because of time and financial constraints, to complete this task as part of the present report.

The communication measures used in this report were derived from the structured tasks. The structured communication tasks represent several levels of difficulty. They were presented in a sequence with stopping rules, so that children were not given tasks that were too complex.

The first level included two simple commands that the mother gave to the child. Following the book reading, which began the session, the mother was told to ask the child to place the book in a designated location. The second command occurred at the end of the session: the mother was given a bag of toys and asked to have the child select one to keep. Both commands could be given through a combination of linguistic and gestural cues. They thus formed the first level of complexity. The child's response to each command was scored simply as correct or incorrect.

The second level required expressive and receptive abilities at the single word stage. For the expressive vocabulary test, the mother and child were given a box of toys, varying in number according to the age of the child. The toys were the same ones used in the LAB test. The child was shown each toy by the mother and asked to name it. A child's score on this task was the number of intelligible labels produced. A label was accepted regardless of whether it was spoken or manual, conventional or idiosyncratic, as long as it was recognized by the mother.

The receptive portion of the vocabulary test was given after the period of free play with the toys. The mother was asked to name each toy, have the child identify it and place it back in the box. Children who were five or six years of age were additionally asked to sort the toys

into a large and a small box on the basis of size. Seven-year-old children were requested to sort the toys into small, medium, and large boxes. Children received one point for each toy correctly identified. They also received a separate score that reflected their general understanding of the sorting task.

Children who scored 5 or more on the receptive vocabulary test were given a task that required the comprehension of simple phrases. The mother was given a card containing four pictures, each one portraying a simple action or event, such as a girl pushing a doll carriage, a man working with a hammer, and a woman baking a cake. In random order, the mother described each picture and asked the child to indicate the picture described. There were three cards, each containing four pictures. A child's score was the number of pictures correctly identified on the first choice.

The final task required the ability to comprehend connected discourse. The mother was shown a cartoon strip and asked to tell the story to the child without showing the pictures. The child was then given the four separate pictures and asked to sequence them in the order of the story. There were two picture sequences, and the child received a total score for overall performance. This task was given only to six- and seven-year-old children who had correctly identified at least eight of the action pictures in the preceding task.

Each of these communication tasks, plus the book reading and free play sessions, was videotaped for later observation of the modes of communication used by the mother and by the child. A number of scores were derived from the individual tasks. The receptive vocabulary score was the score on that one task. A receptive total score was obtained by summing the child's scores on the receptive vocabulary, picture selection, and picture sequencing tasks. The score on the expressive vocabulary task was taken as a measure of expressive ability. See appendix C for further details about the mother-child communication measure.

3.11. READING

Children who were six or seven years of age were administered the Gates-MacGinitie test of reading ability (Primary, Form A). This standardized test includes both a vocabulary and a reading comprehension section. The instructions were modified for deaf children, and additional practice examples were included to compensate for language difficulties.

3.12. MATHEMATICS

Children who were six or seven years of age were administered a test of basic mathematical skill. A survey of existing tests found that they all relied heavily on language skills for item administration and response. Therefore a new test was compiled. The test includes five new subtests developed especially for this study: copying numbers, writing numbers, number sequences, rational counting and one-to-one correspondence. The scores from these five subtests were summed to yield a basic-concepts score. In addition, the

computation subtests from the Primer and Primary I forms of the Metropolitan Achievement Tests were both administered, and summed to produce a computation subscore. The sum of all scores yielded a total math score. Details of the test are given in appendix D.

3.13. SOCIAL DEVELOPMENT

Social development was viewed as one of the major outcome variables of the study. Along with linguistic and academic development, it was considered an important criterion for evaluating the success of various educational approaches.

Social development normally includes the areas of self help (eating, sleeping, toileting), peer relationships, independence, responsibility, and communication. However, given the handicap of deafness and the fact that language development was to be studied so intensively in its own right, it was decided that the social development scale should not assess communication ability, nor should individual items reflect linguistic skill.

Two other requirements were established for the measure: that it have sufficient items relevant to the preschool period, and that it reflect normal development, while covering areas that are felt to be particularly troublesome for deaf children.

A study of existing instruments failed to uncover any that were entirely suitable. Nevertheless, we were reluctant to develop a completely new scale because its reliability and validity would not have been demonstrated and it would not have norms related to normal development.

As a result, a compromise strategy was adopted. A scale was located that had fairly good coverage of the age range desired -- the scale constructed by G. D. Alpern and T. J. Boll (1972), called the Developmental Profile. The Alpern and Boll scale is composed of five subscales: (1) physical (2) self help (3) social (4) language, and (5) academic development. The scale has been fairly well validated against a large sample of hearing children. It has also been used for several years by Kathryn Meadow at Kendal Demonstration Elementary School in Washington, D.C.

Part of the Alpern and Boll scale was used as the core of a new scale that was developed for the project. Only the first three subscales were used, as the latter two areas were adequately covered by other measures used in the study. Subscale 1 (physical development) was administered as is. The other two scales were administered in their entirety, but in a reorganized form. Each of these two scales covers a very broad area of development. In order to obtain more detailed information on the development of hearing-impaired children, the two scales were reorganized into 12 new areas. Additional items were generated for each area in an attempt to cover 11 age-steps within the span from one to nine years, with three items at each step. The additional items were generated from Gesell's description of developing behaviour. In some cases, it was not possible to generate the required number of items or to

cover the entire age span, because the behaviour was not sufficiently complex or because development was completed before nine years.

The 12 areas are briefly described as follows:

1. Eating: primarily skill with utensils, but also development of preferences and eating formalities;

2. Toileting;

3. Dressing: learning to dress oneself, including selecting appropriate clothing;

4. Bathing: cleanliness and grooming;

5. Sleeping: bedtime rituals, regulation of sleep, self-sufficiency regarding bedtime;

6. Play and pastimes: structuring free time, selecting and organizing play activities;

7. Personhood: developing a sense of "self", a sense of individuality; in later years, a growing self-awareness, including self-criticism;

8. Peer relations: interacting with other children, from parallel play to best friends and gangs; wanting to be with peers and caring about them;

9. Personal space: developing the ability to travel away from the house and family; gradually widening the territory in which the child feels secure and competent;

10. Comprehension: awareness of basic social categories (e.g., safe-unsafe, good-bad, right-wrong); awareness of simple social rules (e.g., taking turns, rights of possession); the emergence of "common sense", what to do, what's important, what's relevant and meaningful in social contexts;

11. Responsibility: developing self-discipline, a sense of duty and reponsibility;

12. Sequence: awareness of spatial, temporal, and functional sequences, such as anticipating the return of a family member, having a concept of time, carrying out an activity that involves a particular order of events (e.g., fixing a sandwich).

The physical scale was mailed to parents along with another questionnaire that preceded the initial interview. At the time of the interview, the remaining items were presented. The interviewer introduced the scale by saying that it concerned general behaviour and social development. The interviewer emphasized that the scale covered a wide age range and that no child was expected to show all of the behaviours described.

Each subscale was also introduced with a brief description. The items in each subscale were arranged in developmental order. The interviewer usually began presenting items rated at one year below the child's actual age. Parents' comments during the interview and the interviewer's knowledge of the child were also used to determine where to begin in the sequenced list of questions. The below-age items were presented in order to establish a *basal*

age for a topic, that is, an age at which all items are passed. The interviewer went as low in the scale as was necessary in order to obtain a basal age. The interviewer then continued to present items until three items for two consecutive age periods were failed. This established the child's *ceiling* on that subscale. Each subscale was handled in a similar fashion.

In subsequent years of the study, the interviewer began presenting items one year below the child's previous ceiling in order to establish a new basal age, and then proceeded to establish the new ceiling.

A number of scores were derived from this scale. Each item was first of all scored as correct or incorrect and a total score obtained for each subscale. The scores on the subscales for eating, toileting, dressing, and bathing were summed to produce a self help total. A social relations total was produced from the sums for sleeping, play and pastimes, personhood, and peer relations. The sum of personal space, comprehension, responsibility, and sequencing yielded a social comprehension score. A child's total social development score was obtained by summing the scores for all 12 scales.

A detailed description of the scale and its development is given in appendix E.

3.14. PARENT INTERVIEW

The parent interview was designed to collect two general types of information: historical information on the child and information on the structure and nature of the family. Because the interview was the family's first contact with the project, it also provided an opportunity to explain the goals of the research and establish rapport with the family.

Once parents had agreed to participate in the study, an interview was scheduled with the mother in her home. Prior to the interview, a questionnaire was mailed to the family. The purpose of the mailed questionnaire was to allow the family to review certain historical facts in advance so that the information obtained during the interview would be as accurate as possible and so that the length of the interview could be reduced somewhat. The physical scale of the social development measure was included with the mailed questionnaire.

At the interview, the research officer reviewed the mailed questionnaire and the physical scale and dealt with any problems that had occurred. Much of the interview involved asking parents to elaborate on the information given in the questionnaire by providing more detailed information and their feelings about past events.

The interview and mailed questionnaire were based largely on instruments developed by Kathryn Meadow at Kendall School and by Susan Gregory. The complete interview is included as appendix F. It covers the following general areas:

1. Family composition: who lives in the home; other people who spend significant periods of time with the child; hearing status of family members; educational level of the parents;

2. Medical and diagnostic history of the child: birth history; medical history; age of onset of loss; detection, diagnosis, and initial consultation concerning loss;

3. Hearing aid history: when aid first obtained; number and type of aids; patterns of hearing aid usage;

4. Educational history: programs attended; length of attendance; parents' reasons for selecting particular programs; parents' opinions of programs;

5. Parents' involvement in educational programming: frequency and type of contact with the school; sources of information on deafness; nature and intensity of any educational activities carried out by parents in the home;

6. Communication: methods of communication used in the home; use of second language in home; involvement in sign language instruction;

7. Discipline techniques: method of training children in basic social behaviour, such as toileting, safety, temper control; extent to which parents are equally strict with deaf and hearing children; agreement between parents on matters of discipline;

8. Family interaction: nature and frequency of interactions between the deaf child and other members of the family.

3.15. CLASSROOM OBSERVATIONS

A variety of types of information was collected in classrooms, including teachers' descriptions of their program goals and methods, logs of classroom activities, and data from structured observations. The procedures used and the data collected are described in detail in chapter 4.

3.16. RESEARCH STAFF

A large number of people contributed to the study. In addition to the principal investigators, three Ph.D. level psychologists were employed for various periods of time. Dr. Peter Dean, trained in cognitive psychology, worked on the initial literature review, organized the initial sample census, and established general operating procedures for the study. Dr. Rita Simon, who has an extensive background in assessment, was largely responsible for the social development measure, as well as the training and supervision of testers. Dr. Judi Kobrick, a clinical psychologist and special educator, helped develop the mother-child interaction measure, in addition to training and supervising testers.

Persons responsible for testing, interviewing and coding were drawn from a wide variety of backgrounds. Lee Johnson is a teacher of the deaf with experience in audiological and intellectual assessment. Adele Churchill is the daughter of deaf parents and is skilled in manual communication and interpreting. Cathy Lee Roark is a teacher of the deaf and speech pathologist. Anne Colquhoun has a master's degree in linguistics. Nancy Dye has trained in Early Childhood Education and has experience working with deaf children.

Graduate students from the OISE Department of Special Education were also involved in the study as testers, coders, and data analysts. These students had backgrounds in teaching, language acquisition, speech pathology, and vocational rehabilitation.

Woon Teck Leong, a student in OISE's Department of Measurement, Evaluation, and Computer Applications, did her doctoral dissertation using some of the early data from the study. The dissertation was an investigation of the applicability of a new statistical technique to large-scale studies of this type. In completing the thesis, Dr. Leong undertook much of the initial cleaning and coding of the data. Her preliminary analysis suggested hypotheses that were later explored using the full set of data, as well as statistical techniques that could be used.

3.17. DATA BANK

This report provides an overview of the study and addresses the major questions the study was designed to answer. The data collected, however, were very rich and yielded a bank of information that will be further analysed in the future, as these issues are explored in greater depth.

Chapter 4
THE EDUCATIONAL PROGRAMS

All major programs within Ontario serving hearing-impaired children through the early elementary years participated in the study. The only exceptions were a few small programs in local boards of education that did not then have children in the specified age range, or programs that began after the study was completed. No agency declined to participate.

Participating programs are listed in table 4.1. It should be emphasized that this table lists only programs that had children in the study. It does not include recently developed programs or programs serving older children.

The first part of this chapter provides a general description of the organization of services for young hearing-impaired children within Ontario. The second part discusses more specifically the nature of the programs and their approaches to curriculum.

4.1. NOTE ON DEFINITIONS OF COMMUNICATION MODES

Many terms are used to refer to the various modes of communication used with the hearing impaired. In this report, we make frequent use of the terms *auditory*, *auditory/oral*, and *total communication*. We also refer, although less frequently, to *simultaneous method*, *Visible English*, and *cued speech*.

In addition to the controversy over methods, there is a debate in the profession over the definition of terms. The Conference of the Executives of American Schools for the Deaf has accepted the following definition of total communication (see also Boyd, 1977):

> Total communication is a philosophy incorporating appropriate aural, manual, and oral modes of communication in order to ensure effective communication with and among hearing impaired persons.

Commonly, however, educators and parents do not make a clear distinction between total communication as a philosophy of educating deaf children and total communication as a specific teaching technique. In Ontario the term *total communication* generally refers to any program that incorporates the use of sign language, and we have chosen to use it in this way.

Our use of the term implies nothing about the manner in which the sign language

Table 4.1

Educational Programs Included in the Study

Agency	Type of Service
Regional Resource Centres	
E.C. Drury (Milton)	Home Visiting Residential and Day School
Robarts (London)	Home Visiting Residential and Day School
Sir James Whitney (Belleville)	Home Visiting Residential and Day School
Local Boards of Education	
Carleton Board Various Schools	Itinerant Service
Dufferin-Peel County Separate Board Newman P.S.	Segregated Classes
Frontenac County Board McArthur/Rideau Hts. P.S.	Segregated Classes
Halton County Various Schools	Itinerant Service
Hamilton Board Queensdale P.S.	Segregated Classes
Lincoln County Board Briardale P.S.	Segregated Classes Resource Program
London Board Lorne Avenue P.S.	Segregated Classes
New Liskeard Board	Itinerant Service
Ottawa Board Centennial P.S. Various Schools	Segregated Classes Itinerant Service
Peel County Board Corsair P.S.	Segregated Classes
Peterborough Board Central P.S.	Segregated Classes
Renfrew County Board	Itinerant Service
S. St. Marie Board McMullin P.S.	Segregated Classes
Sudbury Board Wembley P.S.	Segregated Classes Resource Program
Toronto Board Metropolitan Toronto School for the Deaf Clairlea P.S. Buttonwood P.S. Cameron P.S. Various Schools	Day School Segregated Classes Segregated Classes Segregated Classes Itinerant Service
Waterloo County Board Smithson P.S.	Segregated Classes
Windsor Board Victoria/Central P.S.	Segregated Classes
Hospital Programs	
Chedoke Hospital	Out-patient Program
Children's Hospital of Eastern Ontario (Ottawa)	Out-patient Program
Hospital for Sick Children (Toronto)	Out-patient Program
Other Agencies	
Bob Rumball Centre for the Deaf	Segregated Classes
Hearing Handicapped Centre (Peterborough)	Segregated Classes
Omni Nursery School (Belleville)	Segregated Classes
York University	Home Visiting

Note: This table lists only agencies and programs that participated in the study. It does not include recently developed programs or programs serving older children.

component is co-ordinated with speech. The provincial schools currently use the term *congruent manual English* for methods in which there is a manual component that is simultaneous to and congruent with spoken English. We have used the more common term *simultaneous method* in this case (see, for example, Moores, 1978, p. 15). As part of our study, we obtained data on the manner in which teachers used sign language, and this data will be reported as part of the description of educational programs.

Likewise, we have called *auditory* those programs commonly known by that term, namely, the two major hospital programs. These programs include other educational components that are independent of communication mode but that have become associated with the term *auditory* through practice.

The term *auditory/oral* is used to refer to all other programs that did not include a manual component. A more familiar term in the literature for such programs is *oral*. Again, however, our usage reflects practice in Ontario, where it has become common to use the term *auditory/oral* in recognition of the fact that oral programs incorporate many auditory techniques.

Our terms, therefore, are pragmatic rather than definitional and are the terms generally used in research studies of this type. We hope that the reader will accept them as being the most clearly communicative.

4.2. ORGANIZATION AND MODE OF SERVICE DELIVERY

Preschool and early elementary children in Ontario are served by three types of agencies: the three provincial schools for the deaf, hospitals, and local boards of education. These agencies provide a complex network of services that vary by type of agency, geographical location, and agency history.

The provincial schools offer a comprehensive range of service for children of all ages. The three schools, which are funded directly by the Ontario Ministry of Education, are the Sir James Whitney School in Belleville, the E.C. Drury School in Milton, and the Robarts School in London. Together they cover all areas of the province.

4.2.1. Home Visiting Programs

The provincial schools serve infants and pre-school aged children through home visiting programs. Home visiting teachers visit families, generally in the families' homes, and provide a flexible program geared to individual needs.[5] Visits are generally two to two and

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[5]Throughout this report, we have used the term teacher for persons serving a teaching function. Almost all of these persons were certified teachers, and most were certified teachers of the deaf. In a few cases, the individuals providing instruction were not certified or were trained in other disciplines. The term teacher was used, nevertheless, in recognition of the fact that the goals and methods were generally the same.

one half hours in length and vary in frequency according to location and the number of children to be served. In southern Ontario, teachers typically visit three times a month. In the north, visits usually occur only once or twice a month and may be even less frequent.

During the visit, home visiting teachers counsel parents, provide direct instruction to children, and instruct parents in working with their children. Some children in home visiting programs also attend regular day-care centres, nursery schools, and kindergartens. Home visiting teachers may visit these children in school, providing support to the school teacher and direct instruction to the child. School visits sometimes continue into the early elementary years for children who are integrated into local boards. Home visiting teachers thus play a number of roles.

4.2.2. Provincial Schools.

Upon attaining school age, children in home visiting programs may enrol in programs offered by either the local board of education or the provincial schools. Most children enrolling in the provincial schools attend specialized classes for hearing-impaired children within the school, staffed by qualified teachers of the deaf. The provincial schools integrate some children into regular schools operated by the board of education in their locality. Children attend provincial schools on either a day or a residential basis, depending on the distance from home.

The provincial schools provide instruction in all methods of communication. Home visiting teachers use auditory, auditory/oral, or total communication techniques, depending upon the abilities of the child and the wishes of the parents.

Within the provincial schools themselves, a number of methods are used. When the study began in 1979, most classes used Visible English (simultaneous speech and fingerspelling). Since that time, the schools have expanded their range of communication techniques to include other forms of manually congruent English. Even in total communication or Visible English classes, teachers attempt to adapt to the needs and abilities of individual children. Some children may be frequently addressed in speech alone, while others consistently receive speech plus sign. The differing demands of various subject areas may also affect the choice of mode.

4.2.3. Hospital Programs

Services for hearing-impaired children are also provided by a number of hospital programs. Chedoke Hospital in Hamilton serves several hearing-impaired children through its Department of Speech Pathology. One child from this program, who was instructed using cued speech, was included in the sample. Some children enrolled in school board programs for the hearing impaired received supplemental services from departments of speech pathology.

Two of the children's hospitals are major service agencies - the Hospital for Sick Children in Toronto and the Children's Hospital of Eastern Ontario (CHEO) in Ottawa.[6] Like the home visiting programs, the hospital programs provide direct, one-to-one service to children and their families. Children are usually seen once a week with their mother. In Toronto, sessions are typically 45 minutes in length; in Ottawa, one and one half hours. Sessions usually occur at the hospital, although there are occasional visits to the child's home or school.

Both major hospital programs operate on the philosophy that parents are the child's primary teachers. Weekly sessions focus on evaluating the child's progress, modelling teaching techniques for the parent, and developing educational targets to be worked on in the following week. Families are expected to work on assignments through a combination of incidental teaching and, in many cases, formal daily lessons.

The hospital programs emphasize the auditory approach. CHEO uses total communication as a diagnostic measure with children who are not progressing auditorially, followed by referral to total communication programs in the area.

Children who remain in hospital programs usually enrol in regular schools. They may continue to see the clinical instructor throughout the early elementary years, or they may be serviced by an itinerant teacher of the deaf employed by the local board. Some children receive both types of service.

4.2.4. Local Boards of Education

Local boards of education are serving growing numbers of hearing-impaired children of school age. The Toronto Board of Education has a full-time teacher for children under age three, and several other boards serve infants on an informal basis. Most children in board programs, however, are three years of age or older.

A number of boards have specialized classes for hearing-impaired children. The Toronto Board of Education operates a day school -- the Metropolitan School for the Deaf -- as well as segregated classes in regular schools scattered throughout the Metropolitan Toronto area. Centennial School, which is part of the Ottawa Board of Education, has several segregated classes and enrols children from the various area boards.

Each of these boards integrates some children into regular classrooms. Children who are integrated receive additional support from a teacher of the hearing impaired located in that school or from an itinerant teacher serving several schools. Children who are integrated may also receive help from speech therapists, special education teachers, psychologists, and other professionals employed by the board.

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[6]The North York General Hospital program was not yet operative at the time this study began.

Boards vary in their communication policies. At the beginning of the study, only the Lincoln County and Sudbury boards of education offered total communication at the preschool level. By the time the study concluded, however, total communication classes had become available in Hamilton, Kingston, Kitchener, Ottawa, and Toronto as well.

Several other agencies for the hearing impaired provided educational services for a few children in the study, among them the Bob Rumball Centre for the Deaf, the Hearing Resource Centre in Peterborough, the Omni Nursery School in Belleville, and the preschool program at York University. Children in the study also received services from agencies dealing with communication disorders and agencies specializing in other handicaps.

Audiological services are an important part of a child's total educational program. Most children in the study were initially evaluated and fitted with a hearing aid by the Hospital for Sick Children, the Children's Hospital of Eastern Ontario, or the provincial schools. Children living in the Toronto and Ottawa metropolitan areas usually continued to receive audiological service from one of the hospitals. If enrolled in a hospital program, they were routinely monitored as part of their total educational program. Recently the Hospital for Sick Children began serving children in schools, using a mobile van.

Children in programs run by the provincial schools generally received audiological services from trained staff within the school. In addition to doing periodic testing, the schools also checked aids and made minor repairs. Children enrolled in local boards of education outside Toronto and Ottawa were usually seen by local audiologists, although the provincial schools continued to provide service in some cases.

4.2.5. Dimensions on Which Program Varied

This overview has disclosed a complex network of services to young hearing-impaired children -- services that varied in a number of ways (see table 4.2). One was the extent of parent involvement. Hospital-based programs usually entailed the highest degree of parent involvement, making it an explicit requirement of participation in the program. Although all other programs emphasized the importance of parent involvement, programs reporting to the Ministry of Education have a mandated responsibility to serve all families in their jurisdiction, regardless of the family's willingness or ability to participate in the child's training.

A second way in which programs differed was the extent to which children were educated in an integrated setting. All children enrolled in a hospital program were fully integrated into regular classes. Many children receiving support from a home visiting teacher were also integrated. Board programs included special classes in regular or special schools, as well as itinerant services for children who were integrated. Some children in segregated classes in local boards of education also had integrated placements. Although some children enrolled in the provincial schools were integrated, the vast majority attended the provincial school full-time, either on a day or a residential basis.

Table 4.2

Dimensions of Service

	Parent Involvement	Integration	Co-ordination of Services	Communication Mode	Hours of Programming
Regional Resource Centres					
- Home Visiting Teachers	*	*	*	A/O, TC	*
- Provincial Schools	*	-	**	TC, VE	**
Local Boards of Education					
- Segregated Classes	*	-	*	A/O, TC	**
- Itinerant Teachers	*	*	*	A/O	*
Hospital Programs	**	**	-	A	*

Degree of integration varied with the comprehensiveness and co-ordination of available services. The provincial schools, which generally provided children with the least exposure to hearing students, provided the most comprehensive array of specialized help, including special education, audiology, psychology, social work, and medical service. Special services were available to a lesser degree from local boards of education, depending on the number of hearing-impaired children they enrolled and the level to which their service had developed. In hospital programs, although a wide range of services were available, there was relatively little direct co-ordination between the children's educational programs and any specialized help they received.

The amount of direct co-operation between boards of education and other agencies has been increasing. In some cases, hospital programs and boards of education exchange or purchase services from each other. For example, boards in the Ottawa area purchase the services of itinerant teachers employed by CHEO. This type of co-operation increases the continuity of children's programs as the children move from preschool through the elementary school years. The provincial schools also provide some curriculum support for the children they have integrated in local schools. This, again, increases the degree of co-ordination among the elements of a child's program.

The third way in which programs differed was mode of communication. Hospital programs use the auditory approach. School boards can be characterized as generally auditory/oral at the preschool level, with both auditory/oral and total communication classes available in the early elementary years. The provincial schools offer both auditory/oral and total communication in the preschool years, with an emphasis on total communication or Visible English in elementary school.

Another way in which programs varied was simply the total amount of specialized programming. Some children received a few hours of instruction a week or month, while others, through a combination of services, were enrolled full-time in school.

Added to these complexities is the fact that there was a great deal of movement from one program to another. For hearing-impaired children, even the normal movement due to maturation can involve major program changes. To give the most extreme example, children may transfer from a home visiting program in which they see a teacher in their home twice a month to a residential school, where they live almost full-time.

There was also considerable movement among programs that was not due to age. The most common case was a decision to change from an auditory or auditory/oral approach to total communication. Another change was transferring a child from an integrated placement to a specialized unit, or vice versa.

4.3. CURRICULUM AND PROGRAMMING

In addition to the organization and general type of service, it is important to consider the specific content of the programs and services that are provided. Various types of information were collected on each agency in order to document its program in more detail. The measures used are briefly described below:

1. Teacher interviews: In open-ended discussions, teachers were asked to describe the major elements of their curriculum, their specific approach to instruction, the degree of individualization of their program, and their methods of assessment;

2. Teacher logs: Teachers maintained a record of activities for each child for a period of one week. The log noted the type of activity (see table 4.3) and the amount of time spent each day in that activity. Teachers also indicated the type of classroom organization (i.e., class, small group, work to be completed alone by each member of the group, and individually assigned work) and degree of direct supervision (i.e., complete, partial, or none);

3. Observations: Each teacher was observed for an entire session or, in the case of one-to-one instruction, for several sessions. Observers noted the same information as obtained on the teacher log, and also made ratings of the type of language interaction that characterized each activity;

4. Rating Scales: Following the observation period, sessions were rated on discipline, type of language programming, communication mode, and classroom atmosphere.

Most of this information was collected during the spring of 1979 and 1980. However, observations continued through 1981 until all programs had been covered.

Information was collected during a total of 98 sessions, which involved 59 instructors and 37 schools or programs. These figures include a number of regular classrooms into which hearing-impaired children were integrated. Table 4.4 indicates the number of settings of each type on which information was collected.

The data collected on the educational programs provided information on three important aspects of instruction: curriculum structure, language teaching style, and mode of communication.

4.3.1. Curriculum Structure

One important dimension of preschool instruction that has been extensively studied is the extent to which programs emphasize specific cognitive or general developmental goals. The traditional nursery school in North America is generally of the second type. The primary purpose of nursery programs is to provide children with an opportunity to interact with their peers, develop social skills, and adjust to the demands of the classroom.

Table 4.3

Types of Classroom Activity

COGNITIVE

- Language
  - Auditory Training
  - Speech
  - Language Lesson
  - Language Experience
- Reading
  - Phonics Training
  - Word Recognition
  - Oral Reading
  - Silent Reading
- Other Academic
  - Penmanship
  - Writing
  - Counting and Number Recognition
  - Computation
  - Puzzles and Games
  - Activity Centres

DEVELOPMENTAL

- General Developmental
  - Arts and Crafts
  - Films and TV
  - Music and Rhythmn
  - Drama
  - Group Games
  - Gymnastics
  - Small Muscle Play
  - Large Muscle Play

Table 4.4

Educational Programs Studied

Type	No. of Sessions	No. of Teachers	No. of Programs
Home Visiting Programs			
- Auditory/Oral	15	13	3
- Total Communication	11	a	a
Hospital Programs			
- Auditory	16	3	2
Itinerant Teachers			
- Auditory/Oral	7	5	3
Segregated Classes in Local Boards			
- Auditory/Oral	21	12	9
- Total Communication	7	5	4
Segregated Classes in Provincial Schools			
- Total Communication	8	8	3
Regular Classes			
- Auditory/Oral	13	13	13
TOTAL	98	59	37

[a]The same home visiting teachers offer both auditory/oral and total communication programs.

In contrast, programs developed to meet the needs of handicapped children generally depart from the traditional model, devoting more time to direct teaching of specific linguistic and academic skills. Although the relationship is by no means clear-cut, research on preschool programming for disadvantaged children shows that direct instruction programs are more effective in preparing them for school (Stebbins et al., 1977. Moores' work is the only similar study in the area of deafness, but his results similarly suggest that direct instruction produces better results (Moores et al., 1978). All of these studies, however, have emphasized linguistic and academic growth. It is possible that traditional programs, although less effective in these areas, are more successful in developing social skills (see House et al., 1978).

Information on the type of instruction provided by programs in the study was obtained from the observer logs. The 22 activities listed on the logs can be divided into two broad groups -- those with a specific cognitive focus and those of a general developmental nature. For deaf children, there are three important subcategories of cognitive goals: language, reading, and other academic skills, the last including mathematics, perceptual-motor development, and general knowledge. The activities falling into each category are listed in table 4.3. Using the teacher logs, the average proportion of time spent on each activity was calculated for each program category. This information is presented in table 4.5, part A.

The data show that all programs for the hearing impaired can be considered to be of the direct instruction type. Within all program categories, activities related to language, reading, and other academic skills occupied at least two-thirds of the total time. There was, however, a clear distinction among categories. The three categories in which instruction was provided on a one-to-one basis -- home visiting, hospitals and itinerant teachers -- focused almost exclusively on language instruction: 74 per cent, 94 per cent, and 93 per cent, respectively. Although home visiting teachers devoted some time to other academic activities, their focus was clearly on language.

Segregated classes in local boards spent less time on language instruction, although nearly half of the time (43 per cent) was still devoted to this area. Provincial schools and regular classrooms look virtually identical. About 30 per cent of their time was spent on direct language instruction, although other academic and general developmental activities were also important. In fact, both programs show a fairly equal division of time among these three types of activities.

The differences among programs derived from the total teaching time available. The three program categories that represent individual instruction involved less total time than those that were classroom based. In terms of total time involved, more language instruction was actually provided in segregated classes. Likewise, segregated classes in local boards and regular classes were primarily half-day programs at the nursery and Senior Kindergarten levels. The provincial schools, on the other hand, provided full-day programming.

Part B of table 4.5 indicates the number of minutes per week spent in the various

Table 4.5

Amount of Time Spent in Various Activities by Program Category

A. Proportion of Total Time

	Language	Reading	Other Academic	General Developmental	Frequency of Print
Home Visiting (18)[a]	.74[b]	.02	.20	.04	2%[c]
Hospitals (4)	.94	.06	-	-	3%
Itinerant Teachers (7)	.93	.03	.03	.01	7%
Segregated Classes in Local Boards (28)	.43	.06	.22	.29	23%
Provincial Schools (7)	.34	.08	.25	.33	38%
Regular Classes (13)	.29	.06	.26	.39	10%
OVERALL					13%

B. Number of Minutes per Week

	Language	Reading	Other Academic	General Developmental	Total Minutes per Week
Home Visiting	56	2	15	3	76
Hospitals	47	3	-	-	50
Itinerant Teachers	28	1	1	-	30
Segregated Classes in Local Boards	294	42	154	203	693
Provincial Schools	442	104	325	429	1300
Regular Classes	145	30	130	195	500

[a] Indicates the number of sessions observed.

[b] Estimated from the amount of time on teacher logs devoted to in-class instructional activities. This amount does not include time spent on management, transition, and regularly scheduled out-of-class activities. such as gym and library.

[c] Estimated percentage of all teacher utterances accompanied by print.

activities by program category. It shows that the greatest amount of specialized language programming occurred in the provincial schools, followed by segregated classes in local boards. Children receiving one-to-one instruction spent less time in specialized language training. Many of these children, however, were also integrated into regular classrooms. Thus, they also received the non-specialized language instruction that is part of any regular program.

The clear focus of these programs on language is apparent in the data. It is interesting to note that reading was given little direct emphasis at the preschool level. Although little time was spent in formal reading lessons, however, teachers frequently used print in combination with other language activities. For example, a language experience activity may have involved speech, signs, and print as children discussed and then recorded an experience. Thus, the data on the amount of time devoted to reading underestimate the children's total exposure to print.

More accurate data on the use of print comes from the classroom rating scales, which included a rating on the frequency with which teachers used print. This rating appears in the last column of table 4.5, part A. The data show that, although segregated classes spent little time in concentrated reading activities, there was a significant amount of incidental instruction in print. This was especially true in the provincial schools. The data are consistent with the teacher interviews. Only 25 per cent of the teachers reported having a formal reading program, while an additional 32 per cent said that they introduced reading as part of other activities.

4.3.2. Language Teaching Style

Another important aspect of programming for hearing-impaired children is the nature of the language program -- the content and manner in which language is taught. A long-standing controversy within the field has been whether language should be taught in a *formal* or a *natural* way (Moores, 1978, pp. 212-23).

Although few teachers actually used these terms, all were clearly aware of the issue. Many teachers emphasized the importance of natural language experience and said that they tried to build their language program around everyday events and activities of interest to the children. This is certainly one important feature of normal language development. Recent research has shown that children learn language as they interact with adults in a natural environment (Bloom and Lahey, 1978, pp. 278-83). Language is not normally learned through formal lessons or drills.

It is now widely recognized, however, that schools do not generally provide a natural language learning environment. Classrooms differ in several important ways from the normal language learning milieu, that is, the interaction between a parent and child (Berlin, Blank, and Rose, 1979). Language in classrooms has been shown to consist mainly of pseudo-

conversations. Teachers dominate the interaction, which is used to test the children's acquisition of the material being taught rather than to exchange information (Mishler, 1975). Classrooms for hearing-impaired children have been shown to be even more "unnatural" in this respect than regular classrooms (Kluwin, 1981). This is a result of their traditional emphasis on teaching English phonology and syntax (Brennan, 1975).

The terms formal and natural have never been clearly defined, and different writers have used them in different ways. In general, a curriculum is referred to as formal if there is a clearly defined sequence of instructional activities with teacher-directed lessons. A curriculum may be said to be natural if the teacher uses everyday activities to stimulate natural interaction and allows participants and the activities themselves to determine the nature of the conversation.

It is difficult, however, to categorize all programs using this simple distinction. Not only do some approaches fall in the middle of the continuum, but some appear formal in some respects and natural in others. Thus, it is necessary to be more precise.

One way to describe this aspect of programming more accurately is to draw a distinction between the *content* and the *process* of language teaching. This is a distinction that can be detected in the literature and that seems to be useful in differentiating approaches. Each program in the study will be considered in these terms. We will ask, for each program, whether the content of the language curriculum is formal or natural and whether the process of teaching is formal or natural.

In general, most language specialists believe that the content of instruction should be formalized or carefully planned, while the process of teaching itself should be as natural and spontaneous as possible. Kretschmer and Kretschmer (1978), for example, present a detailed curriculum in the area of syntax. Daniel Ling (1976) does the same for speech. Both texts also emphasize the importance of formal assessment. The Kretschmers, however, argue that teachers should use natural interaction around meaningful content as the vehicle for language learning. Ling's approach to teaching is much more formal, although he emphasizes the importance of transferring new skills to natural situations (p. 238).

In describing educational programs in Ontario, we will discuss both aspects of language instruction.

4.3.2.1. Content of Language Programs

In describing their educational programs, teachers were asked to comment in detail on their approach to language teaching. A comprehensive language curriculum for hearing-impaired children should attend specifically to auditory training, speech, vocabulary, and syntax. Each teacher's interview was studied to determine the extent to which each of these areas was covered and whether the curriculum content was formal or natural. Formal programs were further differentiated according to whether or not the curriculum sequence

was comprehensive in its coverage of a language area. Through this process, teachers were assigned to one of three categories: formal-comprehensive, formal-partial, and natural. The resulting data are summarized in table 4.6.

Most teachers who fell into the formal-comprehensive category referred to published curriculum guides. For example, Daniel Ling's guide was the most frequently mentioned curriculum in the area of speech. Some teachers used a formal guide but implemented it only partially: they were included in the "partial" total. Some teachers mentioned published or school-developed curriculum guides that were not considered to be comprehensive. They were also counted as partial.

As seen in the table, almost all teachers included some programming in all four areas of language. Speech was the area in which a comprehensive formal curriculum was most often followed (48 per cent). This was usually Daniel Ling's published curriculum (Speech and the Hearing-Impaired Child: Theory and Practice, 1978). Teachers also made use, although much less frequently, of work by Doreen Pollack and Leo Gramatico and of the Northampton Charts and the Phono-Visual system. An additional 28 per cent of teachers followed a partial curriculum in the area of speech.

These figures are in contrast to Donald Moores's claim that the teaching of speech is largely neglected in today's schools (1978, p. 223). This appears not to be true in Ontario.

Ling's speech curriculum frequently also served as a guide to auditory training. Auditory training, however, following either Ling or some other system, was less frequently programmed comprehensively. The largest category of teachers followed a general or partial curriculum in the area of auditory training (50 per cent). Many teachers (38 per cent) described their auditory training program in such a way that it was best characterized as natural; that is, they did not specify a specific curriculum in audition per se, but gave children the opportunity to respond auditorially during speech or language lessons.

Vocabulary was the area of language training that had universal coverage. In fact, vocabulary often appeared to be the real core of the language curriculum. Vocabulary was usually taught informally, using a theme approach. Teachers generally chose themes that are familiar in schools, such as nature, holidays, and seasons of the year. Only a few teachers used formal vocabulary curricula that followed a developmental sequence.

Syntax, or grammar, was generally taught following a partially structured curriculum. Most teachers described a general sequence of syntactic development. Only two teachers described a comprehensive curriculum in the area of syntax that systematically covered the major structures of English.

Most language specialists stress the importance of systematic evaluation of student progress. Evaluation need not necessarily involve formal testing. It is possible to observe students informally during normal classroom activities. Informal observations can form the

Table 4.6

Characteristics of Language Instruction by Area

	Area				
	Auditory Training	Speech	Vocabulary	Syntax	Reading
Curriculum					
Formal - Comprehensive	16%	48%	14%	12%	16%
- Partial	50	28	06	60	8
Natural	38	44	96	58	58
TOTAL	90[a]	94	100	98	68
Assessment					
Comprehensive	10	28	10	18	2
Partial	20	10	12	10	6
TOTAL	30	38	22	28	8
Individualized Instruction					
One-to-one Sessions	72	78	66	52	16
Incidental	16	20	14	16	14
TOTAL	88	98	80	68	30

[a]The total may be somewhat less than the sum of the preceding percentages. Some programs had both formal and natural curricula in an area and thus are included in two of the three figures; however, each program is counted only once in the total.

basis of assessment if they are done systematically and recorded. We considered teacher-made checklists and anecdotal records to constitute assessment if they met these two criteria. Only a few teachers, however, used an assessment system of any type. Speech was the area in which assessment occurred most frequently, again because of the pervasiveness of Ling's system.

A related aspect of curriculum content is individualization of instruction. Most teachers said that they individualized instruction to accommodate the differing needs of the children in their programs. Individualization was most likely to occur in the areas of audition and speech.

Individualization occurred most often through the use of one-to-one instruction. Relatively few teachers reported using incidental techniques, that is, individualizing material during group lessons.

Individualized instruction occurred in classrooms as well as in the home visiting, hospital, and itinerant programs. Most classroom teachers had an aide or were otherwise able to organize the class so that individual lessons could be scheduled. Overall, the teacher log data showed that 8 per cent of each child's classroom time was spent one-to-one with the teacher.

Summarizing the information on the content of language instruction, we might characterize preschool programming as semi-structured or semi-formal. Most areas of the curriculum were formalized to some extent. Other areas were covered through natural programming. Very little systematic assessment was found. Thus, overall, preschool programming falls midway on the formal-natural continuum.

There was some variation in curriculum content by type of program. Information about this is given in table 4.7. Total communication classes in local boards were the least likely to include auditory training. One of the hospital programs did not teach speech in the preschool years. This same program introduced reading, while the other hospital program did not. One of the hospital programs was also more formal than its counterpart in its approach to curriculum.

There was also considerable variation within the other program categories. Looking at teachers individually, we attempted to determine whether there were any who could be considered to be highly formal or natural overall in their approach to curriculum content. Eleven teachers were found who we felt could be considered formal. These teachers had a definite curriculum in each of the four language areas, covered at least three of the four formally, and had a comprehensive curriculum in at least two areas. Ten teachers were found who could be considered natural. Natural was defined more loosely, but in general these teachers covered all four language areas, at least three of them informally. As table 4.8 shows, these eleven formal and ten natural teachers were scattered across program categories.

Table 4.7

Type of Language Curriculum by Program Category

A. Auditory Training

Curriculum	Home Visiting (n=15)	Hospitals (n=2)	Itinerant Teachers (n=5)	Segregated Classes in Local Boards A/O (n=15)	Segregated Classes in Local Boards TC (n=5)	Segregated Classes in Provincial Schools (n=8)
Formal- Complete	20%[a]	50%	40%	13%	0%	0%
- Partial	80	50	60	27	0	63
Natural	13	50	60	60	40	25
TOTAL	100	100	100	93	40	88

B. Speech

Formal - Complete	60	50	60	47	40	25
- Partial	33	0	40	20	20	38
Natural	27	0	0	60	100	50
TOTAL	100	50	100	93	100	100

C. Vocabulary

Formal - Complete	20	100	0	0	20	13
- Partial	07	0	0	13	0	0
Natural	100	100	100	93	40	100
TOTAL	100	100	100	100	100	100

D. Syntax

Formal - Complete	0	50	20	07	0	38
- Partial	93	50	80	40	40	38
Natural	47	50	20	67	60	88
TOTAL	100	100	100	87	100	100

E. Reading

Formal - Complete	0	0	0	20	20	50
- Partial	0	0	20	20	0	0
Natural	60	50	60	67	40	50
TOTAL	60	50	80	73	60	75

Note: Data in this table were derived from an analysis of the teacher interviews.

[a]Each figure indicates the percentage of teachers falling into the category. Where figures within a program type do not sum to 100%, it is because not all teachers within that program category had a curriculum in that area.

We have already seen that one of the hospital programs was highly formal. Table 4.8 shows that several of the itinerant and home visiting teachers had formal programs. Natural programs were most common among classroom teachers. However, overall, most teachers fell into the middle category.

4.3.2.2. Language Teaching Process

In contrast to curriculum, the actual process of teaching language was highly formal. Each session was rated on a series of scales measuring the frequency of various types of lessons.[7] As can be seen in table 4.9, *controlled practice* was the predominant teaching method in programs for the hearing impaired. *Discussion* and *spontaneous conversation* were used much less frequently. In contrast, regular classrooms made less use of controlled practice and greater use of discussion.

In settings for the hearing impaired, interaction was most formalized in the one-to-one programs.

Seven rating scales were used to measure important aspects of linguistic interaction during instruction (see table 4.10). As discussed earlier, language learning in normal children occurs during natural interactions surrounding everyday events. Many teachers, in their individual interviews, acknowledged the importance of activity-based learning. Two of the seven ratings assessed these features of language interaction.

One rating was the extent to which the teacher's language referred to concrete materials that were present in the room (*immediacy*). Out of a possible rating of 5, the overall rating for teachers was 4.5, which is very high (see table 4.10).[8] Teacher language, however, was also rated as highly *impersonal* (average rating of 4.3). This pattern of ratings means that teachers were using concrete activities and materials, but ones that they had selected rather than ones chosen by the children. This was a fact of classroom life in general, as regular classes showed a similar pattern.

One crucial aspect of linguistic interaction is the rule system governing topic selection and turn-taking. In natural settings, the rules are informal; responsibility for conversation is more or less evenly shared. Parents and children talk about the same amount, and both propose topics of conversation. In classrooms, however, teachers generally decide what will be talked about, do most of the talking themselves, and decide when the children will talk and in what order.

Another distinguishing feature of classroom language is that the purpose of

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[7] These ratings were done at the conclusion of each observation visit.

[8] The rating scales were applied to each classroom activity that was observed. The rating for each teacher was the overall average for the activities observed. The average for a program was the average of the teacher averages for that program.

Table 4.8

Number of Formal, Semi-formal, and Natural Teachers by Program Category (Curriculum)

	Formal	Semi-formal	Natural	Total
Home Visiting	4	10	1	15
Hospital Programs	1	1	0	2
Itinerant Teachers	3	2	0	5
Segregated Classes in Local Boards	2	12	6	20
Segregated Classes in Provincial Schools	1	4	3	8
TOTAL	11	29	10	50

Table 4.9

Ratings of Language Teaching

Type	Controlled Practice	Discussion	Spontaneous Conversation
Home Visiting Programs (20)	5.6[a]	2.2	2.0
Hospital Programs (5)	6.0	2.2	1.8
Itinerant Teachers (5)	6.0	1.8	1.4
Segregated Classes in Local Boards (19)	4.4	3.3	3.5
Segregated Classes in Provincial Schools (7)	4.6	3.3	3.4
Regular Classes (12)	2.0	3.8	2.6

[a] On a scale of 1 to 7.

Table 4.10

Ratings of Linguistic Interaction

Type	Immediacy	Impersonal	Topic Control	Turn Control	Response Control	Routines	Rounds
Home Visiting (19)	4.8[a]	4.7	4.7	NA	4.6	3.5	NA
Hospital Programs (3)	5.0	5.0	4.7	NA	4.6	3.3	NA
Itinerant Teachers (7)	4.2	4.6	4.4	NA	4.2	3.8	NA
Segregated Classes in Local Boards (8)	4.7	4.4	4.3	4.8	4.2	4.2	3.7
Segregated Classes in Provincial Schools (7)	4.4	4.2	4.4	4.1	4.0	3.6	2.6
Regular Classes (11)	3.9	4.4	4.3	3.9	4.1	3.4	2.4
OVERALL	4.5	4.3	4.4	4.3	4.2	3.6	2.9

[a] On a scale of 1 to 5.

conversation is not to share information but to teach and to test a child's knowledge. Thus, classroom conversation is characterized by a great many questions from the teacher to which there is a known, right answer. Teachers ask, children respond, and teachers then evaluate the correctness of the response.

This style of interaction is typical of classrooms in general, and it can even be argued that academic instruction is more effective when classrooms are highly teacher controlled (MacKenzie, 1983). Language specialists, however, question whether this is an effective style for language teaching. This issue is far from being resolved, and we felt it was important to try to characterize programs in these terms.

The ratings of language interaction showed that instruction was highly teacher directed (see table 4.10). Teachers determined the topics to be discussed (4.4); most responses of the children were predetermined (4.3), and teachers selected who was to speak (4.2). Furthermore, many of the interactions appeared to be routines that the children re-enacted frequently (3.6) -- activities such as describing the weather or indicating who was present and absent from the daily roster. Many interactions could also be characterized as rounds (2.9) that is, the teacher went around the circle asking each child the same or a similar question. The seven ratings of linguistic interaction were summed for each teacher, and the sample of teachers divided into thirds to create three groups: formal, semi-formal, and natural teachers (table 4.11).

As with curriculum, the ratings show somewhat less structure and formality in regular classrooms. Among programs for the hearing impaired, teachers in the one-to-one programs, especially the hospital programs, were again the most formal. The least formality was found in the provincial schools. Of the 11 least-formal classes 6 were in the provincial schools.

One interesting finding was that incidental speech and incidental auditory training tended to occur more frequently in formal programs. By incidental teaching in these areas, we mean instruction in speech and audition that occurs in the midst of other activities, not as part of formal speech and auditory lessons. Both incidental speech and incidental auditory training were rated as relatively frequent in hospital and itinerant programs. Home visiting programs gave frequent opportunities for incidental auditory training, but not for speech.

4.3.2.3. Conclusion

. Two aspects of language programming in Ontario have now been considered: curriculum content and teaching process. The first we concluded was generally semi-formal, while the latter was highly formal. One-to-one settings appeared to be more formal in both ways.

There was general consistency between the two dimensions. The sample included four teachers who used highly natural techniques in both curriculum and process. All four of these were in total communication classes, one in a local board and the rest in the provincial

Table 4.11

Number of Formal, Semi-Formal, and Natural Teachers by Program Category (Interaction)

	Formal	Semi-formal	Natural	Total
Home Visiting	5	5	2	12
Hospital Programs	1	0	0	1
Itinerant Teachers	1	2	1	4
Segregated Classes in Local Boards	4	3	2	9
Segregated Classes in Provincial Schools	0	1	6	7
TOTAL	11	11	11	33

schools. There were likewise four teachers who had a highly formal approach to both curriculum and process. These teachers were scattered among the various program categories. There was only one crossover -- that is, one teacher who had a formal approach to curriculum, but used an informal process of teaching.

4.3.3. Communication Mode

A final aspect of language programming that will be considered here is communication mode. Information was collected on mode use by means of rating scales. Classes were rated for the incidence of speech, signs, and fingerspelling, as well as the completeness of utterances in each mode (see table 4.12).

For speech, the average rating of 6.0 (on a scale of 0 to 6) indicates that virtually all communications involved speech. Spoken utterance usually formed complete sentences (average rating of 5.1). Total communication classes in local boards showed a high rate of sign usage (5.0). The signed portions of utterances were less complete than the spoken part (4.3). Classes in the provincial schools used sign less than total communication classes in local boards (2.9), but signed utterances were more complete (5.1) -- in fact, almost as complete as speech. Provincial classes also made significant use of fingerspelling (2.1); fingerspelled utterances were virtually as complete as speech (5.8). Overall, there was good matching of the manual with the spoken mode (5.2).

Thus, it appears that total communication classes were generally implementing a simultaneous method of communication in which signs supplemented, rather than replaced, speech. This finding is different from the finding of Moores's earlier study -- that teachers frequently spoke without signing or fingerspelling. Moores did observe an increase in the congruence between speaking and signing over the years during which his study was conducted.

Results from the communication ratings further showed that use of manual communication resulted in speech that was slightly less clear and somewhat slower than the speech in auditory/oral settings. The differences, however, were not large.[9] Another aspect of communication mode is the use of gesture. Moores found a significant use of gesture, particularly in auditory/oral classes -- so much so, that he described such classes as oral-gestural. Gestures were also observed in the Ontario programs, but to a lesser extent (0.9 in Ontario versus 1.6 in Moores's study, both on a 7-point scale).

Moores also found a greater use of gesture in oral than in total communication classes (3.0 versus 1.4). In Ontario, there was no consistent pattern. Use of gesture was highest in

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[9]This general statement is supported by the following data: (1) there was a negative correlation between sign clarity and speech clarity ($r = -.31$, $p = .078$); (2) there was a negative correlation between amount of sign and speech clarity ($r = -.20$, $p = .06$); (3) there was a negative correlation between amount of signing and speed of speech ($r = -.25$, $p = .018$).

Table 4.12

Classroom Observation Ratings of Communication Modes by Program Categories (Teacher to Child)

Program	Incidence				Completeness			Matching of Manual Mode with Speech
	Speech	Signs	Fingerspelling	Gestures	Speech	Signs	Fingerspelling	
Segregated Classes - Local Boards								
- A/O (n = 15)	6.0[a]	0.0	0.0	0.9	5.1	NA	NA	NA
- TC (n = 4)	6.0	5.0	0.5	0.8	5.3	4.3	6.0	5.0
Segregated Classes - Provincial Schools								
- TC (n = 7)	6.0	2.9	2.1	1.3	5.9	5.1	5.8	5.0
Home Visiting								
- A/O (n = 12)	6.0	0.0	0.0	1.1	5.5	NA	NA	NA
- TC (n = 8)	6.0	4.1	0.4	0.6	4.9	4.4	6.0	5.4
Hospitals	6.0	0.0	0.0	1.4	3.8	NA	NA	NA
Resource Teachers	6.0	0.0	0.0	0.8	5.0	NA	NA	NA
Integrated Classes	6.0	0.0	0.0	0.8	5.5	NA	NA	NA
OVERALL	6.0	1.1	0.3	0.9	5.1	4.2	5.5	5.2

[a] On a scale of 0 to 6.

the hospital auditory programs, where gestures were used to cue the types of responses required of the children, and in provincial school classes, where they became part of the total manual system. These differences among programs, however, were small; what is important is the low incidence of gestures in all programs. Moores, in his study, found much greater variation, from a low of 0.8 to a high of 3.0.

Information relating communication mode to curriculum shows few differences between total communication and auditory or auditory/oral programs. It has already been noted that fewer T.C. settings included an auditory training curriculum, and there was some evidence that they more often used an informal approach to curriculum and classroom interaction. There were no differences, however, in the amount of time devoted to language instruction, the amount of time devoted to other areas of the curriculum, or the amount of individualized instruction.

There was some evidence of positive features in classroom atmosphere associated with the use of manual systems. Classes were rated for the presence of the following characteristics which are related to general atmosphere:

1. Students appear to be having fun;
2. Students appear to be involved in their work;
3. Students appear to be bored;
4. The material being presented is challenging but within the children's range of ability;
5. The material being presented is too difficult.

Children with teachers who more often signed complete utterances were rated as less bored ($r = -.54$, $p = .008$) and as having less difficulty with the work ($r = -.22$, $p = .06$). Children, however, appeared less involved as the completeness of fingerspelling increased ($r = -.50$, $p = .041$).

There were no other differences in classroom atmosphere related to mode use. Thus, in general, total communication programs were similar to auditory and auditory/oral programs, except for the addition of the manual component. There were considerable differences between one-to-one and classroom settings and between regular classrooms and classrooms for the hearing impaired. Communication mode per se, however, did not dramatically change the nature of instruction.

Chapter 5
BACKGROUND AND EDUCATIONAL CHARACTERISTICS OF THE SAMPLE

In this chapter, we will discuss the background characteristics and educational history of the children in the sample. Background characteristics include sample participation rates, sex, age, degree of hearing loss, diagnostic history, hearing aid history, intelligence, and socio-economic status of the family. Educational history includes information on the number of children in each type of program for the hearing impaired, the number of children enrolled in integrated programs, the amount of programming, communication modes, and other characteristics of the children's educational experience.

5.1. BACKGROUND CHARACTERISTICS

5.1.1. Participation in the Sample

The census conducted in the spring of 1978 identified approximately 240 children who were eligible for the study. Eligibility was defined by age, hearing loss, and participation in a program for the hearing impaired. All children between the ages of three and five years who had a severe or profound loss and who were served by programs for the hearing impaired were included in the potential population. Children with additional handicaps, such as cerebral palsy or mental retardation, were not excluded.

Letters requesting participation were sent to all families in this group. Positive responses were obtained from 191 families, or about 80 per cent. About 25 children were subsequently eliminated from the sample because they were found not to meet the age or hearing-loss criteria. A few were dropped because they lived in extremely isolated northern areas of the province and could not be included in the data collection.

The remaining 161 children participated in the first round of data collection. Five of these children subsequently moved out of the province and were lost to the study. Three children were dropped because of scheduling problems. This yielded a final sample of 153 children on whom relatively complete data sets were obtained.

To our knowledge, this is the largest such study that has ever been conducted. The sample is broadly representative of a preschool-aged deaf population because it includes a substantial proportion of the eligible children from a large and diverse geographical area.

The study includes all children served by participating programs, not only those whose sole handicap is deafness.

5.1.2. Age

Table 5.1 gives the number of children in each of the test cohorts in the sample. The figures indicate that there were substantial numbers of children at each of the 4- to 7-year age levels. The number of children in the 3-year-old category was less, because this category included only children between the ages of 3 and 3.5. A similar number of children fell into the 8-year-old category -- that is, 7.6 to 8.5 -- when the final round of testing occurred. A small number of children were 9 (i.e., 8.6 to 9.0) at the time of final testing.

5.1.3. Hearing Status of Parents

Of the 153 children, 14, or 9 per cent, had two deaf parents. This group included two sets of twins and one brother and sister; thus, only 7 per cent of the sample families were headed by two deaf adults. An additional 32 per cent of the children had one hearing-impaired parent or another relative with a hearing loss. This means that a total of 41 per cent of the children had one or more deaf relatives and may have been deaf due to genetic factors.

The number of children in the sample with two deaf parents is higher than expected. Rawlings and Jensema (1977) reported that 3 per cent of the deaf children in their U.S. study had two deaf parents. Summarizing a number of studies, Moores (1978, p. 86) concluded that 26 to 30 per cent of deaf children have deaf relatives, which is considerably lower than in the present sample. This suggests that the incidence of inherited deafness may be higher in Ontario than in the United States. This is a hypothesis that would need to be confirmed by demographic studies of the entire population of deaf children. The figures obtained here may be peculiar to this sample or may reflect different methods of reporting.

5.1.4. Sex

Males in the study outnumbered females by a ratio of 56 to 44 per cent. This ratio is similar to the one reported by Moores, of 54 to 46 per cent (Moores, 1978, p. 8).

5.1.5. Causes of Deafness

The data on hearing-impaired relatives suggest that a large proportion of the children were deaf from genetic factors. Heredity, however, was given as the cause of deafness in only 10 per cent of the cases (see table 5.2). Moores (1978, pp. 81-84) provides a good review of the literature on the causes of deafness, citing several studies that he believes to be particularly valid. One study by Vernon (cited in Moores) attempted to determine "minimum" and "maximum" incidence rates for various etiologies, resulting from use of different criteria from

one study to another. Vernon reported that the incidence rates for hereditary deafness ranged from 5.4 per cent to 26.0 per cent, depending on the indicator used. Reis, in another study selected by Moores, reported an incidence figure of 7.5 per cent for hereditary deafness.

The figure of 10 per cent obtained in this study falls within Vernon's range and is close to the figure obtained by Reis.

The largest incidence category in the present study is "unknown", which accounts for 36 per cent of the sample. This is similar to figures obtained in other studies. The figures for rubella (10 per cent) and meningitis (8 per cent) are also similar to those obtained by Vernon.

5.1.6. Hearing Loss

Table 5.3 indicates the level of hearing of children in the sample as measured by pure tone averages, both unaided and aided. When hearing was unaided, the vast majority of the sample, 74 per cent, fell into the profound category. An additional 21 per cent had severe losses. Although the criterion for inclusion in the sample was a loss of 70 db or greater, the sample included nine children with lesser degrees of loss. This occurred because there was still ambiguity about the degree of the child's loss at the time that testing began. Because the degree of loss was not confirmed in these children until testing was well under way, they were retained. Six of them had moderately severe losses. Two fell into the moderate category, and one had hearing in the normal range. These last three represent cases of Treacher Collins' Syndrome.

Table 5.3 also indicates level of aided hearing. With hearing aids, 41 per cent of the sample fell into the normal or mild hearing loss categories. Children in these categories are generally considered to have good potential for developing speech (see, for example, Cozad, 1978, chapter 9). A large group of children (36 per cent) had moderate losses when aided, and the remaining 22 per cent had even lower levels of hearing. Thus, the sample represented a considerable range of usable hearing.

Seventy-two percent of the sample were deaf from birth, and an additional 25 per cent were deafened before two years of age. Thus, 97 per cent of the sample could be considered prelingually deaf.

5.1.7. Diagnostic and Hearing Aid History

The median age at which a hearing loss was suspected was 8 months (see table 5.4). In 88 per cent of the cases, the loss was suspected prior to two years of age.

Help was first sought for the child at a median age of 12 months, and the presence of a hearing loss confirmed at 18 months. Thus, the time from first suspicion of a hearing loss to confirming diagnosis averaged 10 months.

Table 5.1

Age of Children in the Sample

Round	Age[a]						Mean
	3	4	5	6	7	8	
1	35	48	52	16	2	-	4 yrs. 4 mos.
2	-	45	54	44	9	1	5 yrs. 3 mos.
3	-	1	15	34	72	31	6 yrs. 10 mos.
TOTAL	35	94	121	94	83	32	

[a]The age specified is the midpoint of the category. The actual ranges are as follows: 3 to 3.5; 3.6 to 4.5; 4.6 to 5.5; 5.6 to 6.5; 6.6 to 7.5; and 7.6 to 8.5.

Table 5.2

Causes of Deafness

Cause	n	%
Heredity	16	10
Rubella	16	10
Meningitis	12	8
Prematurity	3	2
Other	41	27
Unknown	65	42
TOTAL	153	100%

Table 5.3

Hearing Loss of Children in the Study (PTA)

db	Level[a]	Unaided		Aided	
		n	%	n	%
0-26	Normal	1	.6	12	8.0
27-40	Mild	0	0	50	33.3
41-55	Moderate	2	1.3	54	36.0
56-70	Moderately Severe	6	3.9	15	10.0
71-90	Severe	31	20.5	6	4.0
91+	Profound	111	73.5	13	8.6
	TOTAL	151	100.0	150	100.0
	Mean	97.84		44.49	
	S.D.	18.81		17.95	

[a]ANSI, 1969.

Table 5.4

Diagnostic and Hearing Aid History

	Lower Quartile	Median	Upper Quartile
Loss Suspected	4[a]	8	18
Professionals Consulted	6	12	19
Loss Confirmed	9	18	24
Hearing Aid Acquired	13	20	26

[a]Age in months.

On average, children acquired their first hearing aid by 20 months of age. Ninety-five per cent had acquired an aid prior to 35 months. Sixty-eight per cent of the parents reported no difficulty in obtaining aids; 57 per cent received financial assistance.

Hearing aid usage was reported to be high in this sample. Children generally began wearing their aids when they were obtained, that is, at an average age of 20 months. Initially, aids were worn for an average of 63 per cent of the child's waking hours. By the time of the first interview, aids were being worn an average of 87 per cent of waking time. Thus, some children required time to adjust to the aid, but almost all achieved a high level of usage.

5.1.8. Level of Intelligence

The Leiter test of intelligence was administered to all children as part of round 1. Most children received the WISC-R Performance Scale as a test of intelligence in round 3. Three children, who did not fall within the age range of the WISC-R, were given the WPPSI in round 3. The WISC-R and WPPSI tests were administered by psychologists in the provincial schools. In the case of 20 children, it was not possible to arrange transportation to the provincial schools for testing, so the Leiter was administered again by our research staff.

As noted in chapter 3, the WISC-R and the WPPSI correlate highly and can be considered equivalent tests. This is not true for the Leiter and the WISC-R. The literature indicates that the two tests correlate only moderately, which means that they measure somewhat different aspects of intelligence. Moores and his colleagues (1978), for example, found correlations between the Leiter and WISC-R of .54 in their seven-year-old sample. In the present study, Leiter and WISC-R scores correlated .65. This relatively low figure is due to differences in the two tests, as well as to the fact that they were administered two to three years apart.

The WISC-R and WPPSI tests are considered to be more valid than the Leiter, and these scores will generally be used in the analysis. In those cases where the Leiter was again administered in round 3, Leiter scores were used rather than omit the child from the analysis.

The sample as a whole scored somewhat above average on the two tests. Round 1 intelligence scores on the Leiter averaged 115, and round 3 scores on the WISC-R averaged 109 (see table 5.5). Normally, IQ scores average 100. It is not unusual, however, for hearing-impaired preschool populations to score higher. This occurred in Moores's study, for example. It does not seem to occur in older samples (Trybus, 1981, personal communication), and the higher scores obtained by young hearing-impaired children may reflect the extensive preschool programming they have received, the advantages of which disappear in later years.

In the present sample, most children scored in the normal or high normal range. There was also an unusually large number of children scoring in the gifted range, especially on the Leiter test, which was administered to the youngest age group. Very few children scored below the normal range.

Table 5.5

Intelligence Scores

IQ	Level	Round 1 (Leiter)		Round 3 (WISC-R)	
		n	%	n	%
Below 70	Retarded	4	2.8	5	3.5
71 to 85	Low Normal	6	4.2	9	6.3
86 to 115	Normal	59	41.3	70	48.6
116 to 130	High Normal	41	28.7	49	34.0
131+	Gifted	33	23.1	11	7.6
TOTAL		143	100.0	144	100.0
(Mean)		115		109	
(S.D.)		20		19	

Note: The Leiter International Performance Scale was administered to all children in round 1. In round 3, the performance scale of the WISC-R was given. A few children, who fell below the age range of the WISC-R, were given the WPPSI. Twenty children, who lived too far from the provincial schools where the WISC-R and WPPSI tests were administered, received the Leiter again.

Thus, in terms of intelligence, the sample appears to represent an average or slightly above average population of preschool-aged, hearing-impaired children. Standard deviations for the tests are also close to what would be expected, indicating that the sample showed normal variation in intelligence.

5.1.9. Socio-economic Characteristics of the Family

Parents' occupations were coded using Blishen's index (Blishen, 1976). This index ranges from 12 to 75, providing a fine discrimination among occupations of varying status. The index is based both on level of education required for an occupation and income earned. Thus the index reflects both economic and educational factors.

It has been found that parents of higher socio-economic status are generally better able to support their child's educational program. The advantage does not necessarily result from parents' greater motivation or ability. It is true that high SES parents are usually better teachers of their children because of their own higher level of education. Economic factors, however, also play a role. Parents who are relatively affluent have more time and resources to spend on their children. It is easier for mothers who do not work, for example, to participate in educational programs. Families with fewer economic pressures have an advantage in dealing with any type of problem, including a handicap.

These are gross generalizations to which there are many exceptions. Numerous working parents, for example, actively participate in language training programs with their deaf children. Nevertheless, there is a general educational advantage associated with high socio-economic status, and this advantage probably operates with handicapped children as well.

Our study included families from a wide range of socio-economic backgrounds. Blishen's scale is usually divided into six ranges. These are indicated below, with the percentage of the sample falling into each:

Professional, technical	70 +	5.1%
Professional, technical	60-69.99	22.9%
Semi-professional, business	50-59.99	13.5%
Semi-professional, business	40-49.99	18.7%
Clerks, skilled workers	30-39.99	23.7%
Semi- & unskilled workers	below 30	16.1%

The overall average for the group was 47, which falls in the middle of the range.

5.1.10. Language Background

Almost all of the children (95 per cent) were born in Canada. A substantial number of the mothers (30 per cent) and fathers (38 per cent) were born in other countries. Nevertheless, the language environment of the children in the study was generally English. Only 14 per cent of the mothers ever used a second language with their child, and most of these (8.5 per cent of the sample) used it only "some of the time" or "rarely". Only 2.0 per cent of the mothers used the second language more than half the time. Ninety-five per cent of the deaf children's siblings used only English with the child.

It is undoubtedly true that the language background of the home affects the child's developmental progress. It was not feasible, however, to investigate this factor as part of the present study, because of the preponderance of English usage in the children's homes. In order to study the effect of language background, it would probably be necessary to use some measure of the parents' facility in English.

5.2. EDUCATIONAL HISTORY

5.2.1. Enrolment in programs for the Hearing-Impaired

Table 5.6 shows the percentage of children enrolled in the various program categories, by age. The figures show considerable change over the age range studied. The largest providers of service to 3-year-olds were the home visiting and hospital programs. At age 4, segregated classes in local boards of education emerged as important. At this age, the sample was fairly evenly divided among these three program categories.

By age 5, enrolment in home visiting and hospital programs had declined, and the largest enrolment was found in the segregated classes in local boards. Itinerant programming, most of it provided by local Boards, also emerged at this age for the first time.

At age 6, enrolment in local board programs began to decline as children moved into the provincial schools. By age 7, the provincial schools enrolled the largest number of children, a total of 50 per cent of the sample. Local boards, however, were still providing for 30 per cent of the sample in segregated classes and an additional 11 per cent through itinerant and resource programs.

Although the type of service changed, the provincial schools provided for the largest number of children throughout the age range, first through the home visiting programs and then through classes in the schools. Local boards of education were also important providers of service. The hospital programs enrolled significant numbers of children at ages 3 and 4, but their enrolment dropped considerably after that.

Table 5.7 shows the grade levels in which children were enrolled. Children 3 and 4

Table 5.6

Primary Educational Program by Age

Type of Program	Age											
	3		4		5		6		7		8	
	n	%	n	%	n	%	n	%	n	%	n	%
Home Visiting	14	41	28	31	24	20	9	10	1	1	1	3
Hospital	14	41	24	27	9	8	4	4	4	5	1	3
Itinerant/Resource in Local Boards	1	3	1	1	10	8	9	10	9	11	8	25
Seg. Class in Local Boards	5	15	33	36	61	51	32	36	24	30	13	41
Provincial School												
Day Students	-	-	-	-	7	6	20	22	28	34	1	3
Residential Students	-	-	1	1	4	3	10	11	13	16	6	19
Other	-	-	2	2	4	3	2	2	1	1	-	-
Not Enrolled	-	-	1	1	1	1	4	4	2	2	2	6
TOTAL	34	100	90	100	120	100	90	100	82	100	32	100

Note: "Primary educational program" is the child's major program at the time of testing. In some cases, children were enrolled simultaneously in two programs for the hearing impaired; "primary program" was taken as the one in which they received more hours of instruction or the one that instructed them in their primary mode of communication. If the child had just recently enrolled in a new program, the previous program was retained as primary because it had had more opportunity to affect the child's development.

years old were generally enrolled in individualized programs. At age 5, many children were still enrolled in individualized programs, but large numbers had moved into preschool and Junior Kindergarten classes. Within the 6-year range (i.e., ages 5.6 through 6.5), the bulk of the enrolment had moved into Senior Kindergarten; within the 7-year range (6.6 through 7.5), into Grade 1; and within the 8-year range (7.6 through 8.5), into Grade 2.

5.2.2. Hours of spec alized instruction

Differences in the type of service offered by the various programs resulted in vast differences in the amount of special programming children received. Home visiting teachers generally visited each family three times a month for approximately 2 hours each visit. This was equivalent to about 60 hours of instruction per year. Hospital programs provided sessions of 1 to 2 hours four times a month, which also totalled about 60 hours a year. Enrolment in a class or school for the hearing impaired involved many more programming hours. Boards of education generally provided half-day classes through Senior Kindergarten, for a total of about 500 hours of instruction per year. Classes were full-day thereafter, for a total of about 1000 hours per year. Beginning in Senior Kindergarten, the provincial schools provided full-day classes, which totalled about 1100 hours per year.

Table 5.8 shows the average number of hours and the range for each age group. The figures show a steady increase in programming hours over the age range. They also show tremendous variation within ages. By age four, for example, children in the study had accumulated from between 0 to 1965 hours of specialized instruction.

5.2.3. Enrolment in regular programs

Many children were enrolled in regular programs as well as in specialized programs for the hearing impaired. Cumulative hours of regular instruction are also shown in table 5.8. These figures show steady increase across ages as well as tremendous variation among children.

Table 5.9 shows the enrolment by age in various types of regular class settings. The figures show that 50 to 60 per cent of the children were enrolled in some type of regular setting and that these figures were fairly constant across the age range from three to eight. By round 3, the children had spent an average of 39 per cent of their instructional time in an integrated setting, with no significant differences by age.

Hospital programs, in particular, emphasized integration. Many children enrolled in home visiting programs or attending half-day classes in local boards of education were also placed in half-day regular programs. The regular programs the children attended included the range of academic and non-academic settings. Nursery schools predominated until age four. At age five, 23 per cent of the children were enrolled in regular school; by age eight, the figure had increased to 47 per cent.

Table 5.7

Highest Level of Instruction by Age

Hearing-Impaired Program (HIP)

Level[a]	Age											
	3		4		5		6		7		8	
	n	%	n	%	n	%	n	%	n	%	n	%
Individualized	27	79	46	51	40	33	16	18	14	17	9	28
Preschool/ Jr. K.	6	18	29	32	35	29	4	4	1	1	-	
Senior Kindergarten	-		1	1	25	21	37	41	2	2	1	3
Primary (Preschool to Grade 1)	1	3	12	13	19	16	11	12	1	1	-	
Grade/Level 1	-		1	1	-		18	20	40	49	11	34
Grade/Level 2	-		-		-		-		22	27	5	16
Grade/Level 3	-		-		-		-		-		3	9
Grade/Level 4	-		-		-		-		-		3	9
Not Enrolled in HIP	-		1	1	1	1	4	4	2	2		
TOTAL	34	100	90	100	120	100	90	100	82	100	32	100

[a]The levels are listed in ascending order. Thus, children who were enrolled in both an individualized program and Senior Kindergarten would fall here into the latter category.

Table 5.8

Cumulative Hours of Instruction by Age

Age	Program			
	Hearing Impaired		Regular	
	$\bar{X}$	Range	$\bar{X}$	Range
3	137	30 to 860	166	0 to 800
4	407	0 to 1965	480	0 to 5250
5	894	30 to 3350	691	0 to 7000
6	1566	50 to 4565	897	0 to 5000
7	2427	80 to 6000	1282	0 to 8750
8	2899	30 to 5640	1475	0 to 4200

Table 5.9

Regular Program Enrolment by Age

Program	Age											
	3		4		5		6		7		8	
	n	%	n	%	n	%	n	%	n	%	n	%
Special Setting	2	6	7	8	7	6	6	7	2	2	1	3
Day Care	2	6	12	13	8	7	5	6	6	7	1	3
Nursery	13	38	38	42	36	30	11	12	3	4	0	0
Regular School	1	3	7	8	28	23	32	36	36	44	15	47
Not Enrolled	17	50	33	37	50	42	43	48	39	6	16	50
TOTAL[a]	(35)		(90)		(120)		(90)		(82)		(32)	

[a]Figures and percentages add up to more than the totals because some children were enrolled in more than one program.

Table 5.10 shows the level of instruction in regular settings, by age. When regular school settings first became important at age five, most of the children were enrolled in Junior Kindergarten. At age six, the bulk were enrolled in Senior Kindergarten, thereafter moving into Grade 1 at seven years, and Grade 2 at eight years of age. Thus, the level into which children were integrated generally mirrored the level of their specialized placement.

5.2.4. Additional Assistance

Beyond specialized and regular school programs, some children received additional assistance. In round 1, 22 per cent of the children in the sample received additional assistance, primarily from speech therapists. In rounds 2 and 3, the numbers receiving additional help were similar: 18 per cent and 21 per cent, respectively. Many of these older children were receiving help from speech/language teachers and from resource teachers in the elementary schools.

5.2.5. Parent Training

A significant part of the children's total programs was the help they received from their parents. Thirty-five per cent of the families had enrolled in the John Tracy course early in the child's educational history. At the time of round 1, 97 per cent of the parents said that they were attempting to provide some help to their child in language development.

For some parents, the help provided was of a general nature. Parents reported that they "talked to the child a lot", "tried to speak more clearly", read to the child, or spent time with the child in educational games and activities. Parents who learned manual communication were included in this category, unless they also engaged in other activities. Thirty per cent of the families fell into this group.

Most parents, however, worked with the child on specific educational goals, usually as part of the specialized program in which the child was enrolled. As discussed in chapter 4, the hospital programs required, as a condition of enrolment, that parents provide direct, daily instruction to the child. The home visiting and some of the public school programs also encouraged parents to teach their child. Sixty per cent of the parents provided direct instruction to the child through regular, systematic, structured lessons. In general, these parents also provided informal and incidental instruction throughout the day.

An additional 11 per cent of parents provided all of the child's training through informal and incidental methods, although they worked on specific goals and used specific educational techniques.

Direct instruction could involve substantial numbers of hours. Parents providing instruction through formal lessons were about evenly divided among those who spent less than three hours a week on lessons (37 per cent), those spending between three and six hours

Table 5.10

Highest Level of Instruction by Age

Regular Program

Level	Age											
	3		4		5		6		7		8	
	n	%	n	%	n	%	n	%	n	%	n	%
Individualized	1	3	6	7	8	7	5	6	4	5	-	-
Preschool/ Jr. K.	15	44	48	53	46	38	8	9	5	6	-	-
Senior Kindergarten	-	-	-	-	14	12	25	28	6	7	-	-
Grade 1	-	-	-	-	-	-	3	3	24	29	7	22
Grade 2	-	-	-	-	-	-	1	1	4	5	8	25
Grade 3	1	3	3	3	2	2	5	6	-	-	1	3
Not Enrolled	17	50	33	37	50	41	43	48	39	48	16	50
TOTAL	34	100	90	100	120	100	90	76	82	100	32	100

(34 per cent), and parents spending between six and nine hours a week (25 per cent). Four per cent of the parents spent more than nine hours a week. In 40 per cent of families, the father was involved in lessons to some extent.

Parents also reported other activities related to their child's education. By round 1, almost all of the mothers of total communication children (40 of 47) had taken a sign language course. Forty per cent of the parents read books to their child daily, and an additional 28 per cent read to the child more than once a week. Fifty-four per cent had attended a conference on deafness; 44 per cent belonged to an organization related to deafness; and 16 per cent subscribed to relevant magazines. Parents were directly involved in the educational community in which their child participated: 74 per cent of the parents knew other deaf children and the same number knew other parents with deaf children. Forty-three per cent knew a deaf adult.

Thus, parents were active partners, playing major roles in their children's educational lives.

5.2.6. Communication Mode

An important part of each child's education is the approach used to provide language training. Table 5.11 shows the percentage of children receiving instruction in each of the various modes of communication.

The auditory designation was limited to children enrolled in one of the two major hospital programs. Home visiting programs used an exclusively auditory approach with some children, although they generally combined auditory with oral techniques. Thus, the distinction between auditory and auditory/oral is somewhat arbitrary.

The table shows that at age three the sample was divided among the auditory, auditory/oral, and total communication groups, with the last being somewhat smaller than the other two. By age five, the auditory group had declined, with a corresponding increase in the auditory/oral group. Part of this change reflects movement from the hospital-based programs to itinerant programs in local boards of education. This is the expected route for successful auditory children and further blurs the distinction between the auditory and auditory/oral groups. As will be discussed later, this overlap complicates the data analyses.

The decline in the size of the auditory sample also reflects movement from the hospital programs to segregated classes in local boards. There was an increase in the number of total communication students at ages six and seven, which occurred as children moved into the provincial schools.

Visible English was not an important group, and only one child was using cued speech. For purposes of the analysis, the cued speech child was eliminated, and the Visible English children were collapsed into the total communication group.

Table 5.11

Current Communication Mode by Age

Mode	Age											
	3		4		5		6		7		8	
	n	%	n	%	n	%	n	%	n	%	n	%
Auditory	13	38	24	27	9	8	4	5	5	6	-	-
Auditory/Oral	12	35	36	40	75	63	38	44	34	43	19	63
Total Communication	9	26	28	31	30	25	40	47	35	44	9	30
Visible English	-	-	-	-	5	4	3	3	6	8	2	7
Cued Speech	-	-	1	1	-	-	1	1	-	-	-	-
TOTAL	34	100	89	100	119	100	86	100	80	100	30	100

There was some increase with age in the number of children being instructed manually (i.e., total communication and Visible English). If we compute the cumulative percentage of time that children were instructed manually over the three rounds, we find an increase from 22 per cent in round 1 to 29 per cent in round 2 and 34 per cent in round 3.

5.2.7. Differences Between Deaf and Hearing Parents

As discussed above, 14 children had two deaf parents. Overall there were few differences between these children and the rest of the sample. There were no differences in either aided or unaided hearing loss. There were also no differences in intelligence, as measured by either the Leiter or the WISC-R. Deaf parents measured slightly lower than hearing parents on the Blishen index of socio-economic status, with an average of 41 points (versus 48 points for hearing parents).

Deaf children of deaf parents were more often enrolled in programs using manual modes of communication. In round 1, 69 per cent of the children with deaf parents, compared to 30 per cent of those with hearing parents, were enrolled in manual programs. By round 3, the figures had increased to 71 per cent and 41 per cent, respectively. Of the children from deaf families, even those enrolled in auditory/oral programs generally used Ameslan at home, as almost all of the deaf families made predominant use of this communication system. Most of the deaf families could also be said to be part of the deaf community, participating in the social network of deaf adults.

Research generally shows that deaf children from deaf families score higher than deaf children from hearing families on tests of achievement (e.g., Vernon and Koh, 1970). It is not known to what extent this differential is due to differences in the cause of deafness, to greater acceptance of the handicap on the part of deaf parents, or to early exposure to a complete system of manual communication.

Because of these differences, and regardless of the cause, deaf children from deaf families were generally analysed as a separate group throughout this report, and the data related to their level of achievement will be discussed in a separate chapter (Chapter 9).

Chapter 6
THE DEVELOPMENT OF LANGUAGE

6.1. CHARACTERISTICS OF CHILDREN IN VARIOUS PROGRAMS

In the researcher's ideal study, children are randomly assigned to programs. This feature of the design ensures that children in the various programs have similar characteristics thereby making it possible to conclude that differences in development are due to differences in the program, not to initial differences in the children themselves. In real life, however, random assignment to programs is neither possible nor desirable, and in the present study we found considerable differences among the children enrolled in various programs. These differences reflect judgements that educators and parents had already made about the suitability of various programs for various types of children. Furthermore, differences between the program groups increased over time, as children who were not progressing well in certain programs were moved to others.

In general, in Ontario at the time of our study, children were first placed in auditory or auditory/oral programs; only later, if their progress was unsatisfactory, were they moved to total communication programs (see chapter 5). Thus, total communication was primarily a remedial option.

By the time of round 1, total communication children, by and large, were already those who had not done well in other programs. This difference was even more pronounced by round 3, reflecting additional movement among programs.[10] In round 1, the numbers of children in auditory, auditory/oral, and total communication programs were, respectively, 28, 71, and 47. By round 3, these had become 18, 65, and 65. Only about half of the children had been in the same program throughout their educational history, and most of these children were in auditory and auditory/oral programs. By round 3, the numbers of children in these "pure" groups were as follows: auditory - 17; auditory/oral - 37; and total communication - 10.

The most noticeable difference among children in the various programs was in degree of unaided hearing loss. In general, children enrolled in T.C. programs had a greater degree of loss. In round 1, the average PTA's for children enrolled in total communication, auditory and auditory/oral programs was, respectively, 104 db, 99 db, and 95 db. By round 3, the differences were even more pronounced: 106 db, 98 db and 95 db. This change reflects

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[10] Because the children using Visible English was so small, they were included in the T.C. group.

differential movement from program to program, with the children having greater losses tending to move from auditory or auditory/oral to total communication programs.

A somewhat different pattern emerged for aided hearing loss. Total communication children again had the highest loss: 49 db in round 1 and 53 db in round 3. The auditory and auditory/oral groups, however, were similar to each other in levels of aided hearing: 39 db for auditory children in both round 1 and round 3; 43 db and 40 db for auditory/oral children.

There was no evidence that hearing itself changed with age. We had initially planned to obtain yearly measures of hearing loss, but problems in obtaining tests and the unreliability of tests with younger children made this impossible. Multiple assessments were collected from those children on whom they were available. Eventually, however, it was necessary to select a single test for each child that represented the most reliable and complete assessment.

A preliminary analysis was conducted on a small number of auditory children on whom multiple assessments were available. The data suggest that children's hearing, both aided and unaided, was stable over the time period of the study. There were no systematic changes with age. Fluctuations that did occur reflected changes in the physical status of the child or the unreliability of the test. Even speech discrimination scores did not improve with age, except, of course, as children developed enough vocabulary to take the test.

Thus, children who remained in auditory and auditory/oral programs had somewhat more aided hearing than the rest of the sample, at least within the time period investigated.

Program groups also varied by IQ. The order of groups by intelligence was auditory, auditory/oral, and total communication. In round 1, the respective average scores for the three groups were 115, 109, and 107, but the differences were not significant. In round 3, the average IQs were significantly different: 117, 111, and 104. Note that these figures were derived from the round 3 WISC-R test. They therefore reflect differences in the children enrolled in and remaining in various programs, rather than changes in IQ over the time period.

Program enrolment varied by the socio-economic status of the parents. Children in auditory programs came from families that in round 3, averaged 54 on Blishen's index of occupational status. Parents of children in auditory/oral and total communication programs averaged 46 and 45, respectively. Thus, auditory families were more highly educated and had higher income levels. This difference likely reflects the fact that auditory programs required extensive involvement of all parents whose children were enrolled.

There were other differences in educational programs associated with the various modes. One obvious difference which resulting from the structure of the programs themselves was that auditory children had fewer hours of specialized, teacher-mediated programming. By round 1, auditory children had accumulated an average of 87 hours of

instruction, versus 637 for the sample as a whole. By round 3, these figures had increased to 260 and 2148, respectively. Auditorily trained children had, however, accumulated many hours of instruction from their parents that were not included in these totals.

In round 1, there was little difference between auditory/oral and total communication children in the hours of specialized training they had received: 752 and 790 hours, respectively. By round 3, however, the T.C. group had accumulated more hours of specialized instruction than auditory/oral children (2753 versus 2065), reflecting the movement of T.C. children into the provincial schools.

There were also differences among groups in the amount of experience in regular classes. Perhaps surprisingly, in round 1, T.C. children had the greatest amount of regular program experience. Over all groups, the average number of cumulative hours of regular programming was 496. Correcting for differences in age, the average cumulative hours for total communication, auditory, and auditory/oral children were, respectively, 722, 333, and 529 hours.

These differences reflect the fact that T.C. training in the early years was provided largely by home visiting teachers. Because home visiting instruction did not include school experience, an attempt was also made to place children in regular classes in the local community. Regular class placement, although an integral part of the auditory program, appears to have begun at a later age. In the early years, the auditory program appears to place primary emphasis on direct instruction by the parents.

Many auditory/oral children were also placed in regular classrooms, either in conjunction with home visiting instruction or primary placement in a segregated class for the hearing impaired. Many of the children in segregated classes, however, did not receive a supplemental placement. Integrated placements may not have been available for these children or may not have been seen as essential, as the children were already receiving classroom instruction. Also additional hours of formal programming may have been considered undesirable for children who were so young.

By round 2, the amount of regular class experience among the three groups was more nearly even. Auditory children, however, had risen to first place, with an average of 941 hours, correcting for age. Total communication children averaged 842; auditory/oral children still had the least amount of integrated experience, 609 hours. By round 3, the auditory children were well ahead with an accumulated total of 2104 hours of regular class instruction, followed by the auditory/oral children with 1311. Total communication children were now behind, with only 865 hours. This relatively low figure again reflects their movement into the provincial schools, where integrated placements were less available.[11] Finally, there

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[11] The fact that total communication children as a group showed so little increase in hours of regular instruction from round 2 to round 3 reflects, in part, changes in the composition of the T.C. sample from round to round.

were differences among program groups in various areas of achievement. In particular, it was the least successful members of the auditory and auditory/oral groups who moved into total communication programs. Overall, children moving into total communication programs had lower scores on all measures than children already in such programs. Thus, each year the total communication group encompassed lower and lower functioning children.

This pattern of differential selection and retention makes it difficult to assess the results of various approaches. In general, we might say that any effects that are found *overestimate* the benefits of auditory and auditory/oral program, and *underestimate* the value of total communication approaches, because the latter were largely used remedially.

6.2. VARIABLES SELECTED FOR ANALYSIS

In order to determine the variables influencing development, it was necessary to use statistical techniques that could assess the effects of several variables simultaneously. For example, it was impossible to assess the effect of mode of communication without taking hearing loss into account, because children instructed in different modes of communication had different levels of loss. It was impossible to include all of the potential variables in the statistical analysis. The first step, therefore, in analysing the data was to select the variables that were most important.

Simple statistical procedures were used to identify variables that were related empirically to the performance levels of the children. For example, we found strong correlations between hearing loss and development, thereby confirming the necessity of including hearing loss in the analysis. Some variables were included because they were widely considered to be important in the development of hearing-impaired children, even though the initial analysis did not support their importance. Parent training is an example of such a variable.

Most of the variables identified were then broken into categories. For example, hearing loss was divided into three categories: severe, low-profound, and high-profound. Two variables -- age and integration -- were not grouped. Each of the variables is briefly described below.

6.2.1. Age

Each child's age in months at the time of testing was included as a factor in the analysis.

6.2.2. Hearing Loss

The study included a number of measures of hearing loss, including unaided and aided pure tone average, and a classification of the shape of loss. Audiograms were classified by shape into two groups: *right slope* and *other*.[12] Preliminary analysis showed that unaided PTA was strongly and consistently related to the developmental measures. Aided PTA and shape were sometimes related to the developmental measures, but the relationships were neither as consistent nor as strong as those between unaided PTA and the developmental measures. Therefore, unaided PTA was selected as the major measure of hearing loss. Children were categorized into three groups on the basis of unaided PTA:

- Severe: 90 db or less;
- Low-Profound: 91 db to 100 db.
- High-Profound: 101 db or greater.

6.2.3. Intelligence

WISC-R scores were used as the major measure of intelligence and were found to be related to most of the developmental measures. Children were divided into two groups based on the WISC-R score:

- Low: below the mean, that is, 109 or less;
- High: above the mean, that is, greater than 109.

6.2.4. Communication Mode

Children were assigned to auditory, auditory/oral, and total communication groups for each round, based on their instructional mode of communication at the time of testing. For most of the analysis, the auditory and auditory/oral children were assigned to a combined auditory-auditory/oral group, because the number of auditory children was so small. The T.C. group also included the few children in the study who were in Visible English programs.

A problem emerged in analysing the three categories of communication mode. By round 3, the number of auditory children was small because many of the original group had transferred to itinerant programs in local boards of education. In a very real sense, they were still "auditory" children, since this was the expected path for those who were successful. In

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[12] We determined slope by visually inspecting the configuration of the audiogram. Audiograms designated as right slope showed a drop of at least 15 to 20 db over the three major frequencies (250, 500, and 1000 Hz). The other category is composed mainly of audiograms that would be described as flat or U-shaped. The few left sloping audiograms in the sample were also assigned to this category. The validity of the classification was demonstrated by the correlation of slope with performance.

fact, this group of auditory-itinerant children scored higher on most measures than those who were still in auditory programs. This was true in spite of the fact that the two groups were similar in hearing loss, IQ and age. It thus appears that, by round 3, the more successful auditory children had moved away from the hospital programs, while the less successful ones remained. It was therefore decided to retain the auditory-itinerant children in the auditory group. This boosted the number of auditory children in round 2 from 18 to 23, and in round 3 from 9 to 18, with corresponding reductions in the number of auditory/oral children.[13]

6.2.5. Program Type

The variety of specialized programs in which children were enrolled were categorized into two basic types as follows:

- Individual: children instructed primarily on a one-to-one basis, that is, home visiting, hospital and itinerant programs;
- Group: children instructed primarily in segregated classrooms, that is, provincial school programs and specialized programs in local boards of education.

6.2.6. Age of First Program

Children were first enrolled in an educational program for the hearing impaired between 6 and 54 months of age. The average age of first enrolment was 18 months. Children were divided into early and late program groups on the basis of this average:

- Early programming: 18 months or earlier;
- Late programming: later than 18 months.

6.2.7. Parent Training

As discussed in an earlier section, most parents worked with their children to stimulate language development. Some parents worked informally and incidentally, and some provided specific and structured training. Parents who worked with their children were divided into two groups:

- Informal: Parents who provided no instruction or who pursued only general goals or used general methods of instruction. Examples of informal techniques are talking to the child, reading books, and playing games;
- Formal: Parents who had specific educational goals and provided direct

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[13] The differences among children in the three programs that were discussed at the beginning of this chapter are based on these reorganized groups.

instruction. In general, parents involved in formal instruction worked under the guidance of a therapist or teacher of the hearing impaired, who provided educational goals and helped the parent develop effective teaching strategies. Some formal parents used only incidental teaching techniques, but most relied on a combination of incidental techniques and structured lessons.

6.2.8. Integration

Fairly independently of the type and amount of specialized instruction, many children were integrated into regular classrooms. The measure of the amount of integration for each round was the cumulative number of hours of integrated experience.

6.2.9. Factors Not Analysed

A number of factors that might be considered important were not included in the analysis. Sex of child was not included because preliminary analysis showed that boys and girls did not differ in their overall levels of development. Socio-economic status was not included, because in many cases information on the occupational status of the parents was either unavailable or was not clear enough to be coded. The data given earlier showed that family background influenced program selection, so this factor is known to affect development, although it could not be studied directly.

Age of onset of the hearing impairment was not included since so few children were postlingually deafened. Although other studies have found this to be an important factor, it had to be excluded from this research.

A multifactorial analysis of variance with covariates was used to analyse the data. For each measure, an analysis was performed of the total scores for each round. For the repeated measures, analyses were also conducted of the *gain* in scores between rounds. Because of the small size of the auditory sample, an analysis was done using only two categories of communication mode: total communication and a combined auditory-auditory/oral category. A subsidiary analysis was also conducted on each measure using the *three* mode categories: auditory, auditory/oral, and total communication.[14]

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[14]Technically,the six categorical variables were entered into the analysis as factors. The two continuous variables were entered as covariates to enable us to make use of the full range of values.

6.3. SPEECH PRODUCTION AND RECEPTION

The speech skills of children in the study were measured by the speech reception test (ACLC), the word production test (WORDS), and an analysis of a sample of connected speech using Ling's procedure. Table 6.1 gives the results. The table presents the median for each measure, which is the middle score, or the score that divides the sample in half. The table also shows the lower quartile score, which is the score delimiting the bottom quarter of the sample, and the upper quartile score, which delimits the top 25 per cent of the sample.

The data indicate that the children generally showed only limited ability to produce or comprehend speech. The median score for speech reception was only 4 items out of 12, and 25 per cent of the sample scored 0 or 1. Children demonstrated some ability to produce the features of speech: the median number of non-segmental features shown in the connected speech sample was 2.0, and the median number of segmental elements (Articulation) was 24. This means that most children could produce many of the vowels, diphthongs, and simple consonants found in English. This ability was not sufficient, however, to enable them to produce many intelligible words or sentences. The median number of intelligible words was only 5, and the median number of intelligible sentences was 0. The median level of linguistic complexity was 1.0, that is, single words only. Children did somewhat better on the WORDS test (production of intelligible words in isolation). The median score on this test, in which children are asked to name familiar concrete objects, was 8, with a lower quartile score of 2.

Some children, however, did exceptionally well, as indicated by the upper quartile scores. The upper 25 per cent of the sample scored 9 out of 12 on the speech reception test. The upper quartile showed 6 of the 8 non-segmental aspects of speech and 40 of the 58 segmental aspects. This means that these children were able to produce, in addition to the simple speech sounds, many of the word-initial blends. Few children, however, could produce the word-final consonant blends.

The upper quartile also showed good intelligibility and linguistic structure. They produced 48 or more intelligible words within their sample of connected speech and 7 or more intelligible utterances. The measure of linguistic structure shows that at least some of their utterances represented complete, albeit simple, sentences.

Table 6.2 gives the speech scores by age. These are mean scores rather than medians. The means are somewhat higher than the median scores given in table 6.1 because of the influence of the high scores obtained by the upper quarter of the sample. Interestingly, the data show relatively little change with age. There was a systematic increase in the non-segmental and words-in-isolation scores, but none of the other scores showed consistent developmental trends.

Tables 6.3 to 6.6 summarize the results of the analyses of variance on the speech scores. Table 6.3 gives the significance levels for each variable. Non-significant effects are indicated

Table 6.1

Speech Scores

(Deaf and Hearing Parents: n=142)

Measure	Lower Quartile	Median	Upper Quartile
Speech Reception[a]	1	4	9
Speech Production			
Words in Isolation (WORDS)[b]	2	8	23
Connected Speech — Intelligible Words[c]	0	5	48
Connected Speech — Intelligible Utterances[c]	0	0	7
Connected Speech — Articulation[c]	14	24	40
Connected Speech — Non-segmental Aspects[c]	0	2.0	6
Connected Speech — Syllables per Utterance[c]	1.0	5.3	2.1
Connected Speech — Linguistic Complexity[c]	0	1.0	4

[a] Speech reception test (ACLC) - number of items correct out of 12.

[b] Number of words produced intelligibly or perfectly on the word production measure.

[c] Measure obtained using Ling's procedure for analysing connected speech.

Table 6.2

Speech Scores by Age

(Deaf and Hearing Parents: n=142)

Measure		Age				
		5	6	7	8	Mean
Speech Reception[a]		6.0	5.5	5.0	7.3	5.6
Speech Production						
Words in Isolation[b]		11.7	5.5	10.4	15.7	10.7*
Connected Speech	Intelligible Words[c]	45.8	24.2	34.9	55.6	37.4
	Intelligible Utterances[c]	4.4	2.9	4.6	5.0	4.2
	Articulation[c]	29.1	24.9	26.0	32.1	27.11
	Non-segmental Aspects[c]	2.9	2.4	3.1	4.8	3.3*
	Syllables per Utterance[c]	4.2	3.5	5.5	6.1	5.0
	Linguistic Complexity[c]	2.1	1.5	2.1	3.2	1.5

* Scores on this measure improve significantly with age.

[a] Speech reception test (ACLC) - number of items correct out of 12.

[b] Number of words produced intelligibly or perfectly on the word production measure (WORDS).

[c] Measure obtained using Ling's procedure for analysing connected speech.

by "ns". Significant effects are represented by the statistical level of significance, which is always .050 or less for effects reaching acceptable levels of significance, and .055 to .100 for effects considered marginally significant. The table presents the complete results from the primary analysis of the two communication groups: total communication and the combined auditory-auditory/oral group. The bottom row of the table gives the significance levels for communication mode from the subsidiary analysis that used all three categories: auditory, auditory/oral, and total communication. The results from the subsidiary analysis pertaining to the other variables are not presented because they generally mirrored those obtained in the primary analysis.

Tables 6.4 to 6.6 give the grand mean for each measure, the n's and means for each group used in the analysis, and the *unadjusted deviation* and *adjusted deviation* scores. The unadjusted deviation score for a group is the difference between the average score obtained by children in that group and the average for the sample as a whole. The adjusted deviation score is the deviation from the mean adjusted for other differences between the groups. Deviation scores that are statistically significant are underlined and can be inspected to determine the size of significant effects. More detailed information on the use of these tables follows.

Our discussion of speech scores concluded that the sample as a whole had developed only limited ability in speech but that there were substantial individual differences among children. Table 6.3 summarizes the effects of each variable on the speech scores of individual children.

The data presented in table 6.2 showed little systematic increase in scores with age. The analysis of variance allows a more precise determination of the effect of this variable. As can be seen from the first row of table 6.3, however, age was not consistently related to development. Four of the measures -- words in isolation, non-segmental features, syllables per utterance, and linguistic complexity -- did increase significantly with age, but the remaining four did not. It is interesting that two of the measures affected by age reflect grammatical development. It thus appears that age has only limited effects on intelligibility, at least within the period covered by round 3, when these measures were collected, that is, roughly five through eight years.

Unaided hearing loss, on the other hand, had consistent effects on all measures. Study of the deviation tables shows that the effects due to degree of loss were not only statistically significant, but also sizeable. Consider, for example, words in isolation (table 6.4). The grand mean on this measure was 10.30. Children with severe losses, however, averaged 19.96 words, which is 9.66 words above the mean. Even when scores were statistically adjusted for age, IQ, and other differences, children in this category still showed an average score of 8.11 words above the mean. Likewise the table shows that children with losses of 101 db or greater averaged 5.09, which is 5.21 words below the grand mean. Effects of hearing loss on the remaining measures were similar in size.

Table 6.3
Analyses of Variance on Speech Scores - Significance Levels
(Hearing Parents Only)

Predictor Variables	Speech Reception	Speech Production						
		WORDS in Isolation	Connected Speech: Intelligible Words	Intelligible Utterances	Articulation	Non-segmentals	Syllables per utter.	Linguistic Complexity
Age (covariate)	ns	.000	ns	ns	ns	.000	.012	.000
UPTA	.000	.000	.000	.000	.000	.000	.000	.000
WISC	.000	.000	.012	.028	.000	.009	(.088)[a]	.003
Mode (AO/TC)	ns	.000	ns	ns	.000	.002	ns	.035
H-I Prog	.012	ns	(.081)	ns	(.063)	ns	ns	ns
First Prog	ns	ns	ns	ns	ns	ns	ns	ns
Parent Trng	ns	ns	ns	ns	ns	ns	ns	ns
Reg Prog (covariate)	ns	ns	ns	ns	ns	ns	(.076)	ns
Interactions[b]								
UPTA X Mode	ns	ns	ns	ns	(.062)	ns	ns	.013
UPTA X H-I Type	.010	.005	ns	ns	.001	ns	ns	.016
UPTA X First Prog	ns	(.065)	ns	ns	ns	ns	ns	ns
WISC X Par Trng	.049	ns	ns	ns	ns	ns	ns	ns
H-I X Mode	ns	.002	ns	ns	.001	.021	ns	.003
H-I X First prog	.051	.006	ns	ns	.003	ns	ns	.003
Mode[c] (A/AO/TC)	ns	.000	ns	ns	.000	.004	ns	(.092)

[a] Marginally significant effects are in parentheses.

[b] Includes only those interactions for which significant effects were found.

[c] Separate analyses were done using three categories of communication. This row lists the significance levels only for mode; significance levels for the other variables were similar to those obtained in the analysis using two categories of mode.

Table 6.4
Analyses of Variance on Speech Scores - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Speech Reception				Words in Isolation				Intelligible Words			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	108	5.44			111	10.30			118	34.19		
UPTA												
1. ≤90	27	10.15	4.70	4.25[a]	25	19.96	9.66	8.11	30	82.27	48.08	38.19
2. 91-100	30	5.93	0.49	0.31	29	15.21	4.91	3.25	30	45.90	11.71	4.97
3. ≥101	51	2.67	-2.78	-2.43	57	3.09	-6.74	-5.21	58	3.26	-30.93	-22.33
WISC												
1. ≤109	54	4.11	-1.33	-0.73	59	7.61	-2.69	-1.48	60	17.95	-16.24	-8.65
2. 110+	54	6.78	1.33	0.73	52	13.35	3.05	1.67	58	50.98	16.80	8.95
Mode												
1. A/O	66	6.79	1.34	-0.15	63	15.17	4.88	2.24	69	53.10	18.92	3.86
2. TC	42	3.33	-2.11	0.23	48	3.90	-6.40	-2.94	49	7.55	-26.64	-5.44
H-I Prog												
1. Indiv.	30	8.43	2.99	1.02	32	15.28	4.98	1.02	36	66.39	32.20	11.89
2. Group	78	4.29	-1.15	-0.39	79	8.28	-2.02	-0.41	82	20.05	-14.14	-5.22
First Prog.												
1. Eatly	46	4.65	-0.79	-0.28	47	8.66	-1.64	0.40	50	23.72	-10.47	-4.29
2. Late	62	6.03	0.59	0.20	64	11.50	1.20	-0.29	68	41.88	7.70	3.15
Parent Trng												
1. No	28	4.64	-0.80	-0.55	29	8.55	-1.75	1.01	31	16.23	-17.96	-9.25
2. Yes	80	5.72	0.28	0.19	82	10.91	0.62	-0.36	87	40.59	6.40	3.30
Mode[b]												
1. Auditory	14	7.64	1.97	0.85	13	15.23	4.35	2.56	15	71.67	31.90	20.43
2. Oral	57	6.91	1.24	-0.05	55	15.95	5.07	2.40	59	58.41	18.64	2.50
3. TC	42	3.33	-2.34	-0.22	48	3.90	-6.98	-3.44	49	7.55	-32.21	-9.27
MULTIPLE R SQUARED			.652				.702				.416	
MULTIPLE R			.807				.838				.645	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.5
Analyses of Variance on Speech Scores - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Intelligible Utterances				Articulation				Non-segmentals			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	118	3.75			118	26.62			118	3.09		
UPTA												
1. < 90	30	8.13	4.38	3.63 [a]	30	41.53	14.91	11.38	30	5.97	2.87	2.41
2. 91-100	30	5.27	1.51	1.16	30	29.93	3.31	1.05	30	4.03	0.94	0.56
3. ≥ 101	58	0.71	-3.05	-2.48	58	17.19	-9.43	-6.43	58	1.12	-1.97	-1.54
WISC												
1. ≤ 109	60	2.20	-1.55	-0.99	60	22.07	-4.55	-2.03	60	2.23	-0.86	-0.51
2. 110+	58	5.36	1.61	1.03	58	31.33	4.71	2.10	58	3.98	0.89	0.53
Mode												
1. A/O	69	5.41	1.65	0.21	69	33.54	6.92	3.16	69	4.41	1.31	0.55
2. TC	49	1.43	-2.33	-0.29	49	16.88	-9.74	-4.46	49	1.24	-1.85	-0.77
H-I Prog												
1. Indiv.	36	6.31	2.55	0.89	36	35.64	9.02	2.97	36	4.58	1.49	0.52
2. Group	82	2.63	-1.12	-0.39	82	22.66	-3.96	-1.30	82	2.44	-0.65	-0.23
First Prog.												
1. Early	50	2.54	-1.21	-0.54	50	23.10	-3.52	-1.10	50	2.56	-0.53	0.07
2. Late	68	4.65	0.89	0.40	68	29.21	2.59	0.81	68	3.49	0.39	-0.05
Parent Trng												
1. No	31	3.06	-0.69	0.17	31	23.74	-2.88	0.26	31	2.74	-0.35	0.44
2. Yes	87	4.00	0.25	-0.16	87	27.64	1.03	-0.09	87	3.22	0.13	-0.16
Mode [b]												
1. Auditory	15	6.60	-2.36	1.30	15	35.87	8.28	6.14	15	4.53	1.24	1.06
2. Oral	59	5.97	1.73	0.30	59	34.37	6.79	3.10	59	4.68	1.39	0.55
3. TC	49	1.43	-2.81	-0.76	49	16.88	-10.71	-5.62	49	1.24	-2.05	-0.99
MULTIPLE R SQUARED			.339				.609				.563	
MULTIPLE R			.582				.781				.750	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.6
Analyses of Variance on Speech Scores - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Syllables per Utterance n	Mean	Unadjusted Deviation	Adjusted Deviation	Linguistic Structure n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	118	5.02			118	2.08		
UPTA								
1. < 90	30	7.89	2.88	2.24[a]	30	4.13	2.06	1.76
2. 91-100	30	5.13	0.12	-0.40	30	2.67	0.59	0.38
3. ≥ 101	58	3.47	-1.55	-0.95	58	0.71	-1.37	-1.11
WISC								
1. ≤ 109	60	3.98	-1.04	-0.86	60	1.45	-0.63	-0.40
2. 110+	58	6.09	1.07	0.89	58	2.72	0.65	0.42
Mode								
1. A/O	69	5.91	0.89	0.05	69	2.88	0.81	0.18
2. TC	49	3.77	-1.25	0.07	49	0.94	-1.14	-0.26
H-I Prog								
1. Indiv.	36	6.41	1.39	0.07	36	3.19	1.12	0.49
2. Group	82	4.41	-0.61	-0.03	82	1.59	-0.49	-0.21
First Prog.								
1. Early	50	4.08	-0.94	-0.40	50	1.58	-0.50	-0.14
2. Late	68	5.71	0.69	0.29	68	2.44	0.36	0.11
Parent Trng								
1. No	31	4.08	-0.94	-0.76	31	1.68	-0.40	0 08
2. Yes	87	5.35	0.34	0.27	87	2.22	0.14	-0.03
Mode[b]								
1. Auditory	15	5.97	0.73	0.49	15	3.13	0.92	0.66
2. Oral	59	6.29	1.05	-0.02	59	3.03	0.82	0.17
3. TC	49	3.77	-1.48	-0.13	49	0.94	-1.27	-0.41
MULTIPLE R SQUARED			.237				.550	
MULTIPLE R			.487				.742	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Performance IQ also had consistent effects on speech scores, although the differences were smaller.

Communication mode had a significant effect on four of the eight speech measures. Mode did not affect speech reception but did have a significant effect on measures of speech production: words in isolation, articulation, non-segmental features, and linguistic complexity.

The deviation scores from the primary analysis showed that total communication children consistently scored lower than those in auditory and auditory/oral programs. The differences were about as large as those resulting from differences in IQ. Deviation scores from the subsidiary analysis support this finding. These deviation scores further showed that children in auditory programs performed better than those in auditory/oral programs, although the differences were small. The major differences associated with communication mode were between children in total communication programs and the rest of the sample.

Turning to program type, there were one significant and two marginally significant effects favouring individual over group programming.[15] There were also a number of significant interactions, showing that individual programs were more effective for some categories of children. Four of these interactions indicated that individual programs were more beneficial than group programs for children with profound losses. There were no differences between programs for children with severe losses. There were also four interactions showing that individual programs were more beneficial for auditory and auditory/oral children, with no program differences for T.C. children.

The data do not show any overall effect for age of first program. There were, however, four significant interactions showing a superiority for late programming, especially for children receiving individual instruction.

Parent training likewise showed no main effects. There was one interaction between parent training and IQ, showing that formal parent training was more effective than informal training for children with low IQs.

There was only one effect for integration, and it was only marginally significant. The finding was that children with more hours of regular programming scored higher on syllables per utterance. Integration had no effect on any of the other measures of speech development.

Deviation scores can also be accumulated to model the performance of hypothetical children. For example, the average score on WORDS (table 6.4) for a child with a severe hearing loss and a high IQ who is enrolled in an auditory or auditory/oral program would be

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[15]The direction of the interactions can be determined only from an examination of the individual cell means, which have not been included here.

calculated as 10.30 + 8.11 + 1.67 + 2.24, or 22.32. Conversely, a child with a high-profound loss and a lower than average IQ in a T.C. program would be expected to score 10.30 - 5.21 - 1.48 - 2.94, or 0.67. The difference between these two hypothetical children in overall score is dramatic.

6.4. RECEPTIVE LANGUAGE DEVELOPMENT (LAB)

Table 6.7 gives the median and upper and lower quartile scores for the total number of words and propositions correct in all three rounds. In round 1, the median word score was 11 out of 55 items correct. This figure demonstrates only minimal linguistic competence, as the vocabulary used in LAB was very basic and simple. Words selected for the test represented concrete everyday objects that children are familiar with and that previous research had identified as among the first to be learned by hearing-impaired children. The median word score increased to 43 in round 3, but only the upper quartile of the sample approached the ceiling on this measure.

The proposition scores show that the children were only beginning to master the basic structures of English. The median number of propositions correct (out of 40) was 0 in round 1, 5 in round 2, and 17 in round 3. The upper quartile score for round 3 (25) represents slightly more than half of the propositions correct.

Tables 6.8 to 6.10 display LAB scores by age for rounds 1, 2, and 3. Average scores are given by age for number of nouns, number of verbs, and total words correct, as well as for various measures of proposition comprehension in addition to the total score. On most measures, children's performance increased significantly with age. It is interesting to note that the steady increase with age occurred in all rounds, indicating the stability of the LAB measure as a developmental index.

Tables 6.11 and 6.12 present information on the gains in LAB scores from one round to another. The data showed that gains scores on the proposition measures did not change substantially from one age group to the next, but maintained a fairly constant increase from year to year. Word gains were more variable, with a tendency for younger children to show greater gains.

Tables 6.13 to 6.17 present the results of the analyses of variance on LAB. These tables are organized in the same way as the speech tables. Table 6.13 gives the significance levels for words correct, propositions correct, and word and proposition gains. Tables 6.14 to 6.17 give the means and mean deviation scores for each of the four measures.

The analyses reported in table 6.13 showed the same consistent effect for age already noted in the descriptive data on LAB. This finding represents a difference from the results on the speech measures, which did not show consistent effects for age.

Table 6.7

LAB Scores

	Lower Quartile			Median			Upper Quartile		
	Round			Round			Round		
	1	2	3	1	2	3	1	2	3
Total Words Correct	3	12	29	11	25	43	25	36	48
Total Propositions Correct	0	0	7	0	5	17	6	15	25

Table 6.8

Mean LAB Scores by Age: Round 1

(Deaf and Hearing Parents: n=149)

	Age					
	3	4	5	6	7	Mean
(n)	(34)	(46)	(51)	(16)	(2)	
Vocabulary[a]						
Total Nouns Correct	6.85	8.46	11.82	15.12	25.00	10.18*
Total Verbs Correct	1.94	3.85	6.23	9.06	17.00	4.97*
Total Vocab Items Correct	8.79	12.30	18.06	24.19	42.00	15.15*
Propositions[b]						
Total Props Perfect	0.56	2.09	4.67	6.87	14.00	3.30*
Total Props Good	0.24	0.52	0.59	1.63	2.00	0.62*
Total Props Moderate	0.62	2.46	4.41	7.06	12.00	3.33*
Total Propositions Correct (perfect + good)	0.79	2.61	5.25	8.50	16.00	3.91*

* Scores on this measure improved significantly with age ($p < .001$).

[a] The vocabulary list included 29 nouns and 26 verbs, for a total of 55 items.

[b] There were 40 propositions in the test.

Table 6.9

Mean LAB Scores by Age: Round 2

(Deaf and Hearing Parents: n=149)

	Age					
	4	5	6	7	8	Mean
(n)	(43)	(54)	(44)	(9)	(1)	
Vocabulary						
Total Nouns Correct	12.74	14.50	19.39	21.89	22.00	15.91*
Total Verbs Correct	6.35	8.00	11.68	16.56	10.00	9.13*
Total Vocab Correct	19.09	22.50	31.07	38.44	32.00	25.04*
Propositions						
Total Props Perfect	4.40	5.50	10.41	16.78	15.00	7.35*
Total Props Good	0.63	1.04	1.52	1.00	0.00	1.05
Total Props Moderate	4.26	5.26	8.02	8.78	8.00	6.01*
Total Props Correct (perfect + good)	5.02	6.53	11.93	17.78	15.00	8.40*

* Scores on this measure improved significantly with age ($p < .01$).

Table 6.10

Mean LAB Scores by Age: Round 3

(Deaf and Hearing Parents: n=148)

	Age						
	4	5	6	7	8	9	Mean
(n)	(1)	(15)	(30)	(71)	(29)	(2)	
Vocabulary							
Total Nouns Correct	0.00	19.87	20.10	23.10	24.28	28.00	22.30*
Total Verbs Correct	0.00	12.53	12.50	15.72	17.21	21.50	15.01*
Total Vocab Correct	0.00	32.40	32.60	28.82	41.48	49.50	37.31*
Propositions							
Total Props Perfect	0.00	10.87	11.13	15.03	18.23	23.00	14.57*
Total Props Good	0.00	1.47	1.60	1.96	1.24	2.50	1.69*
Total Props Moderate	0.00	7.80	8.00	9.58	8.24	10.50	8.76
Total Props Correct (perfect + good)	0.00	12.33	12.73	16.99.	20.07	25.50	16.26*

* Scores on this measure improved significantly with age ($p < .01$).

Table 6.11

Mean Monthly Gains in LAB Scores From

Round 1 to Round 2

(Hearing Parents Only: n=132)

Age Group (in years)	Gains From Round 1 to Round 2		
	n	Total Words Correct	Total Propositions Correct
4	38	1.12	.45
5	47	1.00	.46
6	38	.94	.47
7	8	.55	.47
8	1	.74	.44

Table 6.12

Mean Monthly Gains in LAB Scores From

Round 2 to Round 3

(Hearing Parents Only: n=132)

Age Group (in years)		Gains From Round 2 to Round 3	
	n	Total Words Correct	Total Propositions Correct
5	11	.54	.36
6	29	.84	.55
7	61	.74	.47
8	29	1.09	.65
9	1	.61	.48

Unaided hearing loss was again an important factor in determining scores, on both word and proposition comprehension. Unaided loss had a significant impact on the gains in proposition scores from round 1 to round 2. For all measures, the effect was the same -- the less the hearing loss, the better the children's performance.

The deviation scores showed this effect to be substantial (table 6.14). The overall average score for words correct in round 1 was 14.89. Children with severe losses scored 7.94 more words correct, for a total of 22.83 words. Children with losses between 91 db and 100 db averaged .62 fewer words correct, or 14.27. Children with losses greater than 101 db averaged 4.32 fewer words correct, or 10.57.

There was a similar effect on proposition scores (table 6.15). Children with severe losses averaged 7.62 words; those with losses in the low-profound range averaged 3.23, and those in the high-profound range averaged 1.65.

Intelligence had a fairly general effect. Significant effects for IQ were found for word scores in all three rounds, for proposition scores in rounds 2 and 3, and for the gain in proposition scores from round 1 to round 2.

Examples of the intelligence effect can again be calculated from the deviation tables. In round 1, children with low IQs scored an average of 3.03 words below the mean, for a total score of 14.89 - 3.03, or 11.86. Children with high IQs scored 2.80 above the mean, or 17.69 words correct.

The findings for hearing loss and intelligence are similar to those obtained for speech. Children with greater hearing performed better, as did those with higher intelligence.

The type of communication used by the child was also a significant factor in development. On the word measures in all rounds, children in total communication programs outperformed children in other programs. Auditory children came next, followed by those in auditory/oral programs. T.C. children made the greatest gains in word scores from round 2 to round 3; auditory children made the smallest gains.

On the proposition measures, the advantages of total communication were most apparent in the later rounds. The three groups performed equally well in round 1. In round 2, there was a marginal effect in favour of the T.C. group, and this group significantly outperformed the other two in round 3. The T.C. group also showed the greatest gain in proposition scores from round 2 to round 3. The auditory/oral group was consistently in last place.

These findings are dramatically different from those obtained on speech, where T.C. children scored lower than auditory and auditory/oral children. Here almost all of the measures favoured the T.C. group.

Table 6.13
Analyses of Variance on LAB Receptive Vocabulary and Proposition Measures - Significance Levels
(Hearing Parents Only)

Predictor Variables	Total Words Correct			Total Propositions Correct			Word Gains		Proposition Gains	
	Round			Round			Round		Round	
	1	2	3	1	2	3	1 to 2	2 to 3	1 to 2	2 to 3
Age (covariate)	.000	.000	.000	.000	.000	.000	(.095)[a]	ns	ns	ns
UPTA	.000	.000	.008	.001	.000	.000	ns	ns	.000	ns
WISC	.022	.012	.011	ns	.036	.014	ns	ns	.014	ns
Mode (AO/TC)	.002	.004	.000	ns	(.084)	.003	ns	.003	ns	.007
H-I Prog	ns	ns	ns	ns	ns	ns	ns	ns	ns	.033
First Prog	ns	ns	ns	ns	ns	ns	ns	.054	ns	.009
Parent Trng	(.070)	ns	ns	ns	ns	ns	ns	ns	ns	ns
Reg Prog (covariate)	(.096)	.032	ns	ns	.045	ns	ns	ns	ns	ns
Interactions[b]										
UPTA X H-I type	.028	.033	.011	ns	ns	ns	ns	ns	.049	ns
Mode X First Prog	ns	.054	(.090)	ns	ns	ns	(.072)	ns	ns	ns
UPTA X First Prog	ns	.030	(.090)	ns	ns	ns	ns	ns	ns	ns
UPTA X Mode	ns	ns	.015	ns	ns	ns	ns	ns	ns	ns
H-I type X Mode	ns	(.100)	.010	ns	ns	.043	ns	ns	ns	ns
H-I type X First Prog	ns	ns	ns	.016	ns	ns	ns	ns	ns	ns
UPTA X WISC	ns	ns	ns	ns	ns	ns	ns	ns	(.098)	ns
Mode X Par Trng	ns	(.091)	ns	ns	ns	ns	ns	ns	ns	ns
Mode[c] (A/AO/TC)	.008	.022	.002	ns	(.096)	.042	ns	.003	(.080)	(.010)

[a] See note a, table 6.3.

[b] See note b, table 6.3.

[c] See note c, table 6.3.

Table 6.14
Analyses of Variance on LAB Measures: Total Words Correct - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1				Round 2				Round 3			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	123	14.89			123	24.72			121	37.02		
UPTA												
1. < 90	34	21.68	6.78	7.94[a]	33	33.33	8.61	10.80	31	41.16	4.14	6.28
2. 91-100	31	14.55	-0.35	-0.62	31	24.71	.01	0.09	31	38.58	1.56	2.28
3. ≥ 101	58	11.10	-3.79	-4.32	59	19.92	-4.81	-6.09	59	34.02	-3.00	-4.49
WISC												
1. ≤ 109	59	11.95	-2.95	-3.03	60	21.25	-3.47	-3.72	61	34.13	-2.89	-4.66
2. 110+	64	17.61	2.72	2.80	63	28.03	3.31	3.54	60	39.95	2.93	4.73
Mode												
1. A/O	86	13.97	-0.93	-2.06	79	24.53	-0.19	-3.06	70	35.60	-1.42	-4.90
2 TC	37	17.05	2.16	4.78	44	25.07	0.34	5.49	51	38.96	1.94	6.72
H-I Prog												
1. Indiv.	62	15.42	0.53	1.69	50	26.94	2.22	3.56	39	38.21	1.19	2.36
2. Group	61	14.36	-0.53	-1.72	73	23.21	1.52	-2.44	82	36.45	-0.57	-1.12
First Prog.												
1. Early	52	14.85	-0.05	1.54	33	23.70	0.16	1.33	51	35.59	-1.43	-0.77
2. Late	71	14.93	0.04	-1.13	90	25.10	-0.12	-1.01	70	38.06	1.02	0.56
Parent Trng												
1. No	32	13.19	-1.71	-1.27	53	24.89	-1.03	-1.00	33	36.36	-0.65	-0.36
2. Yes	91	15.49	0.60	0.45	70	24.60	0.38	0.37	88	37.26	0.24	0.13
Mode[b]												
1. Auditory	22	13.59	-1.07	1.26	18	26.50	1.87	2.80	16	36.25	-1.21	-2.62
2. Oral	66	13.67	-0.99	-3.11	62	24.16	-0.47	-4.04	59	36.49	-0.97	-4.61
3. TC	37	17.05	2.40	4.80	45	24.53	-0.10	4.44	51	38.96	1.50	6.15
MULTIPLE R SQUARED			.410				.403				.316	
MULTIPLE R			.640				.635				.562	

[a]The adjusted deviations that are significant are underlined.

[b]These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.15
Analyses of Variance on LAB Measures: Total Propositions Correct - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1 n	Round 1 Mean	Round 1 Unadjusted Deviation	Round 1 Adjusted Deviation	Round 2 n	Round 2 Mean	Round 2 Unadjusted Deviation	Round 2 Adjusted Deviation	Round 3 n	Round 3 Mean	Round 3 Unadjusted Deviation	Round 3 Adjusted Deviation
Grand mean	123	3.70			123	7.76			121	15.55		
UPTA												
1. <90	34	7.03	3.33	3.92[a]	33	13.94	6.18	7.45	31	21.26	5.71	6.60
2. 91-100	31	3.39	-0.31	-0.47	31	7.19	-0.56	-0.85	31	15.94	0.39	0.65
3. ≥ 101	58	1.91	-1.79	-2.05	59	4.59	-3.16	-3.72	59	12.34	-3.21	-3.81
WISC												
1. ≤109	59	3.02	-0.68	-0.72	60	5.77	-1.99	-2.02	61	13.21	-2.33	3.32
2. 110+	64	4.83	0.63	0.66	63	9.65	1.89	1.93	60	17.92	2.37	3.38
Mode												
1. A/O	86	3.57	-0.13	-0.58	79	8.16	0.41	-1.31	70	15.50	-0.05	-2.83
2 TC	37	4.00	0.30	1.34	44	7.02	-0.73	2.36	51	15.61	0.06	3.88
H-I Prog												
1. Indiv.	62	3.42	-0.28	0.45	50	9.04	1.28	2.03	39	17.44	1.89	1.93
2. Group	61	3.98	0.28	-0.45	73	6.88	-0.88	-1.39	82	14.65	-0.90	-0.92
First Prog.												
1. Early	52	3.92	0.22	1.07	53	8.36	0.60	1.50	51	13.84	-1.70	-0.68
2. Late	71	3.54	-0.16	-0.78	70	7.30	-0.46	-1.14	70	16.79	1.24	0.49
Parent Trng												
1. No	32	2.94	-0.76	-0.39	33	6.52	-1.24	-0.99	33	15.58	0.03	0.46
2. Yes	91	3.97	0.27	0.14	90	8.21	0.46	0.36	88	15.53	-0.01	-0.17
Mode[b]												
1. Auditory	22	3.18	-0.46	1.06	18	9.83	2.07	2.95	16	16.44	0.41	-0.01
2. Oral	66	3.59	-0.05	-1.03	62	7.82	0.05	-2.23	59	16.29	0.26	-2.84
3. TC	37	4.00	0.36	1.20	45	6.87	-0.90	1.89	51	15.61	-0.42	3.29
MULTIPLE R SQUARED			.308				.407				.337	
MULTIPLE R			.555				.638				.581	

[a]The adjusted deviations that are significant are underlined.

[b]These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.16
Analyses of Variance on LAB Measures: Word Gains From Round to Round - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1 to 2 n	Mean	Unadjusted Deviation	Adjusted Deviation	Round 2 to 3 n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	123	0.98			121	0.70		
UPTA								
1. < 90	33	1.23	0.25	0.27	31	0.57	-0.14	-0.05
2. 91-100	31	0.92	-0.06	-0.04	31	0.69	-0.02	0.04
3. ≥ 101	59	0.88	-0.11	-0.13	59	0.80	0.08	0.00
WISC								
1. ≤109	60	0.88	-0.10	-0.05	61	0.70	-0.01	-0.09
2. 110+	63	1.08	0.09	0.05	60	0.73	0.01	0.09
Mode								
1. A/O	79	1.01	0.03	-0.02	70	0.55	-0.16	-0.19[a]
2. TC	44	0.93	-0.05	0.03	51	0.94	0.22	0.26
H-I Prog								
1. Indiv.	50	1.04	0.06	-0.03	39	0.51	-0.20	-0.17
2. Group	73	0.94	-0.04	0.02	82	0.81	0.10	0.08
First Prog.								
1. Early	53	1.05	0.07	0.07	51	0.63	-0.09	-0.12
2. Late	70	0.93	-0.05	-0.06	70	0.78	0.06	0.09
Parent Trng								
1. No	33	0.96	-0.02	0.02	33	0.72	0.01	-0.12
2. Yes	90	0.99	0.01	-0.01	88	0.71	0.00	0.05
Mode[b]								
1. Auditory	18	1.09	0.12	0.03	16	0.42	-0.28	-0.35
2. Oral	62	0.97	0.01	-0.01	59	0.56	-0.13	-0.16
3. TC	45	0.91	-0.06	0.00	51	0.94	0.24	0.29
MULTIPLE R SQUARED			.077				.168	
MULTIPLE R			.278				.410	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.17
Analyses of Variance on LAB Measures: Proposition Gains From Round to Round
(Hearing Parents Only)

Predictor Variables	Round 1 to 2				Round 2 to 3			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	123	0.41			121	0.47		
UPTA								
1. < 90	33	0.74	0.33	0.35[a]	31	0.54	0.07	0.11
2. 91-100	31	0.35	-0.06	-0.05	31	0.44	-0.03	0.03
3. ≥ 101	59	0.25	-0.16	-0.15	59	0.45	-0.02	-0.07
WISC								
1. ≤109	60	0.26	-0.14	-0.11	61	0.41	-0.07	-0.12
2. 110+	63	0.54	0.14	0.10	60	0.54	0.07	0.12
Mode								
1. A/O	79	0.46	0.05	0.02	70	0.41	-0.07	-0.11
2. TC	44	0.31	-0.09	0.04	51	0.57	0.09	0.15
H-I Prog								
1. Indiv.	50	0.51	0.11	0.07	39	0.36	-0.12	-0.14
2. Group	73	0.33	-0.07	-0.05	82	0.53	0.06	0.07
First Prog.								
1. Early	53	0.45	0.04	0.07	51	0.34	-0.14	0.03
2. Late	70	0.37	-0.03	-0.05	70	0.57	0.10	-0.01
Parent Trng								
1. No	33	0.32	-0.09	-0.06	33	0.59	0.11	-0.13
2. Yes	90	0.44	0.03	0.02	88	0.43	-0.04	-0.10
Mode[b]								
1. Auditory	18	0.66	0.26	0.22	16	0.31	-0.16	-0.19
2. Oral	62	0.40	0.00	-0.08	59	0.42	-0.04	-0.10
3. TC	45	0.31	-0.10	0.02	51	0.57	0.10	0.18
MULTIPLE R SQUARED			.216				.185	
MULTIPLE R			.464				.430	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

The deviation scores showed that the effect for mode was substantial. In round 3, children enrolled in total communication programs averaged 4.80 words above the grand mean, for a total of 19.69 words correct. Children in auditory programs averaged 1.26 more words, or 16.15. Finally, children in auditory/oral programs scored 3.11 fewer words, or 11.78.

There was only one overall effect for program type. The change in proposition scores from round 2 to round 3 shows that children in group programs made the greatest gains. In round 3, there were significant interactions between mode and program type. The pattern of results suggests that auditory and auditory/oral children made better progress in individual programs, while total communication children benefited from group instruction. For example, in round 3, total communication children in segregated classes averaged 16.77 propositions correct, while those in individual programs scored 8.29. The combined auditory and auditory/oral group in individual programs averaged 19.44 propositions correct, while similar children in segregated classes averaged only 12.18.

Other interactions further complicate the picture. The effect of program type varied with hearing loss: children with severe losses performed well regardless of program type, whereas children with losses in the low- and high- profound range benefited from individual instruction.

The other variables included in the analysis showed few effects. Age of first program had significant effects on word and proposition gains from round 2 to round 3, but the effects were in opposite directions. On word scores, late starters gained more, whereas early starters made greater gains in proposition scores.

There were a number of interactions involving age of first program. There were one significant and two marginally significant interactions of first program age with communication mode. The interactions involved word and word gain scores and showed that late starters who were in auditory and auditory/oral programs did better than similar children who had started early, whereas among total communication children, early starters did better. A significant interaction on propositions scores in round 1 between age of first program and program type showed an advantage for late starters among children in individual programs but an advantage for early starters among those in group programs. In fact, the highest scoring group consisted of early starters in group programs. Interactions with hearing loss showed an advantage for late starters among children with severe losses.

Parent training was represented by one marginally significant effect that showed an advantage for children who received formal training from their parents. An interaction with mode showed that formal training had value for auditory and auditory/oral children. There were one marginal and two significant effects supporting the value of integration.

6.5. MOTHER-CHILD COMMUNICATION MEASURES

Performance on the mother-child interaction measures was generally high. The three commands that were part of the interaction scenario were usually successfully executed. When mothers told the child to put the book in the desired location following the book reading segment, the proportion of children able to understand and comply was 72 per cent in round 1, 87 per cent in round 2, and 77 per cent in round 3. At the end of the session, mothers were given a bag of toys and told to have the child select one to keep. The percentages successful were 73 per cent in round 1, 93 per cent in round 2 and 99 per cent in round 3. In round 3, when children put the toys away and were asked by their mothers to sort them into boxes of different sizes, 74 per cent did so correctly.

These three commands are quite simple to communicate, because all of them can be expressed accomplished either verbally or through a combination of verbal cues, gestures, and, in the case of the toy sort, repeated example and demonstration. The data showed that children also did quite well on the tasks requiring verbal comprehension. Table 6.18 gives the average scores, by round, for receptive vocabulary, receptive total, and expressive vocabulary. The table gives the medians for each round and the cutoff scores for the lower and upper quarters of the sample.

In round 1, the median score on receptive vocabulary was 9 items correctly identified. This increased to 15 by round 2 and to 22 (out of a possible 24) by round 3. Thus, in round 3, most of the children were performing at or near ceiling. This high level of performance was due in part to learning, as the children were tested on the same items each year. It is important to keep in mind that the vocabulary tested was very basic.

Tables 6.19 through 6.21 give the mean scores by age for each round. The best indicator of the actual level of performance is the score for round 1, when each child took the test for the first time. Even the few six- and seven- year-olds who were tested in round 1 did not reach the ceiling. Near-ceiling scores were obtained only by older children during repeat rounds of testing.

[16] The receptive total score is a sum of the receptive vocabulary, picture selection, and picture sequencing scores. The total possible score on the receptive total is 42. The medians for the receptive total were 16 for round 1, 25 for round 2, and 38 for round 3 (table 6.18). The upper quartile scores again showed substantial numbers of children scoring near ceiling. The high receptive total scores of the children are also seen in the average scores for each age group (tables 6.19 through 6.21).

The mother-child interaction also included asking children to name the objects

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[16] The analysis of the gain scores is not reported here, because most of the significant effects occurred in the gains from round 2 to round 3, where the the ceiling effect was most important.

Table 6.18

Mother-Child Interaction Scores

	Lower Quartile			Median			Upper Quartile		
	Round			Round			Round		
	1	2	3	1	2	3	1	2	3
Receptive Vocabulary	4	9	18	9	15	22	12	20	23
Receptive Total[a]	8	18	32	16	25	38	23	33	40
Expressive Vocabulary	2	9	20	8	15	23	12	21	24

[a]Sum of receptive vocabulary, action pictures, and picture sequencing tasks. Total of 42 possible points.

Table 6.19

Mean Mother-Child Scores by Age: Round 1

(Deaf and Hearing Parents: n=132)

	Age					
	3	4	5	6	7	Mean
(n)	(42)	(29)	(47)	(11)	(3)	
Receptive Vocabulary	6.2	7.5	12.3	14.7	17.0	8.21*
Receptive Total	9.9	14.2	20.8	22.8	34.0	16.19*
Expressive Vocabulary	4.9	6.6	11.3	15.7	18,7	7.58*

*Scores on this measure improved significantly with age ($p < .001$).

available. This yielded a measure of expressive vocabulary development. The scores on this measure were almost identical to those for receptive vocabulary.

Tables 6.19 to 6.21 show that all scores increased systematically with age.

The results of the analyses of variance on mother-child scores are summarized in tables 6.22 through 6.25. Table 6.22 shows that age had a significant effect on all three measures in all rounds. Age had the same effect on LAB scores. Speech scores, however, did not show consistent increases with age.

Hearing loss had a significant effect on all scores, with the exception of expressive vocabulary in round 3. The deviation tables (tables 6.23 through 6.25) show that the effects for hearing level were substantial in rounds 1 and 2, but not in round 3. This was probably due to the ceiling effects, which prevented the most able children from fully demonstrating their ability. The most useful data on mother-child interaction, therefore, are from rounds 1 and 2, where scores were less affected by the ceiling.

The results related to hearing loss repeat the pattern found with both speech and LAB measures; namely, more hearing was associated with higher levels of development.

In contrast to scores on the speech measures and LAB, scores on mother-child interaction were not consistently influenced by IQ. The deviation scores show that high-IQ children were ahead on all measures, but the effects were significant only for expressive vocabulary in round 3, and marginally significant for expressive vocabulary and the receptive total in round 2. Failure to find important effects for intelligence may reflect limitations of the measures.

The analyses showed significant effects for communication mode on all three measures in round 1 (table 6.22). This effect occurred with the primary analyses, which used two categories of mode, as well as the secondary analyses, which used three. The deviation scores (tables 6.23 through 6.25) show that the T.C. group was ahead in round 1, followed by the auditory/oral and finally the auditory groups. The deviation scores also show that the differences were quite substantial -- about the same size as those associated with moving from one category of hearing loss to another.

For example, the average receptive total (table 6.25) in round 1 was 16.21. Children with severe losses in auditory or auditory/oral programs averaged 16.21 + 4.09 - 1.62, or 18.68 items correct. Children with losses in the high profound range did more poorly overall. Children with high-profound losses who were in total communication programs, however, did almost as well as those with severe losses in auditory or auditory/oral programs, scoring 16.21 - 3.33 + 4.34, or 17.22 items.

There were no significant effects for communication mode in rounds 2 and 3, suggesting that the advantages for total communication were short lived. An examination of the

deviation scores from these rounds shows that the auditory group was actually ahead of the other two groups on expressive vocabulary. In round 2, the total communication group was still ahead on the two receptive measures, although the auditory group had almost caught up. By round 3, the auditory group had surpassed both groups, with the auditory/oral group scoring lowest.

The superiority of the auditory group was not apparent, however, in the data from the "pure" communication groups. Recall that there was a total of 64 children who had been educated in the same communication mode since birth: 17 auditory, 37 auditory/oral and 10 total communication children. An analysis of the mother-child scores from these groups again showed no significant differences for rounds 2 and 3, but the deviation scores showed that the total communication children were still a bit ahead.

[17] Further insight into the effect of communication mode comes from an analysis of the effect of mother's mode. Up to now we have considered only the child's official educational mode. During the videotaped interaction, however, it was possible to observe the predominant mode of communication used by mothers with children. When the tapes were later reviewed, mothers were assigned to one of three groups on the basis of their observed communication style. *Auditory/oral* mothers were defined as those using only speech or speech plus natural gesture. Mothers who communicated primarily through speech, but supplemented speech with some signs or fingerspelling, were assigned to an *oral/manual* group. A *simultaneous* group was composed of mothers who were fairly consistent in simultaneously speaking and signing (and/or fingerspelling) complete utterances. In round 1, the number of mothers falling into each of the three groups was, respectively, 93, 14, and 20. By round 3, the figures had become 79, 14, and 36.

The performance of the children was then analysed with reference to these three communication categories. The results showed differences among the three groups that were significant in all three rounds. In general, the simultaneous children were ahead, outperforming the other two groups on all measures in rounds 1 and 3 and on expressive vocabulary in round 2. The oral/manual group had an advantage on the two receptive scores in round 2 but had lost it by round 3. In rounds 1 and 2, the oral/manual group outperformed the auditory/oral group. By round 3, however, the oral/manual group was scoring lowest of all three groups. For example, on the receptive total in round 3, the simultaneous, auditory/oral, and oral/manual groups averaged, respectively, 37.15, 34.40, and 31.62 points. These data suggest that there is a continuing advantage to total communication when mothers use the simultaneous method.

In summary, the results related to communication mode are complex and varied. On the speech measures, the data showed a consistent advantage for auditory and auditory/oral

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[17] Analyses of the speech and LAB measures using these "pure" groups obtained results similar to those already reported. They are therefore not discussed further.

children, with auditory children slightly ahead of auditory/oral children. On LAB, however, there was a clear and consistent advantage to total communication, with auditory children scoring second. On the mother-child measures, there was an early advantage to total communication, which appeared to diminish. The data from the "pure" groups and from the analysis of mother's observed mode suggest that total communication may continue to be the most effective option. Additional research using measures that do not show a ceiling effect and using larger "pure" samples is necessary before definitive conclusions can be drawn. The findings suggest that it is also important to investigate the manner in which signs are used as part of a communication method.

Let us now consider the effect of the remaining educational variables on mother-child interaction -- first of all, type of hearing-impaired program. In round 1, program type had a marginally significant effect on receptive vocabulary and a significant effect on the receptive total. In both cases, children receiving group instruction outperformed those in individual programs. There was a significant interaction between program type and hearing loss on expressive vocabulary: group programming was more effective than individual programming for children with severe- and low-profound losses. There was no difference for children with high-profound losses. Thus, the advantage of group programming was not general.

On both receptive scores in round 1, interaction effects showed that group programming was more effective than individual instruction, but only for children in total communication programs. The highest absolute scores on those measures were obtained by total communication children in segregated classes. For example, the average receptive total score in round 1 was 22.8 for this group, whereas the other three groups clustered around 15 points. The scores of the T.C. children are especially impressive given their greater losses.

In rounds 2 and 3, the findings related to program type are complex and difficult to interpret. There was a main effect on expressive vocabulary in round 3, again showing a general advantage for group instruction. The remaining findings, however, were less straightforward. In round 2, there was one significant and one marginally significant effect involving the receptive scores. Both effects showed a superiority for individual programs. The raw scores showed that children in group programs actually scored higher. When the covariate age was taken into account, however, the deviation scores showed an advantage for individual programs. It thus seems that children in individual programs, although doing less well than those in group programs, were doing better than expected for their age.

Since these findings occurred only in later rounds, it is possible that they reflect a selection factor. It may be that children in individual programs only appeared to be doing better because lower functioning children had been moved into segregated classes. The high scores of the older children in T.C. classes is evidence, then, that these classes are helpful for lower functioning children.

On all three measures in round 2, and on the receptive total in round 3, interactions

Table 6.22
Analyses of Variance on Mother-Child Scores - Significance Levels
(Hearing Parents Only)

Predictor Variables	Expressive Vocabulary			Receptive Vocabulary			Receptive Total		
	Rnd 1	Rnd 2	Rnd 3	Rnd 1	Rnd 2	Rnd 3	Rnd 1	Rnd 2	Rnd 3
Age (covariate)	.013	.000	.000	(.081)[a]	.000	.000	025	.000	.000
UPTA	.011	.000	ns	.020	.019	(.073)	.026	.001	ns
WISC	ns	(.081)	.032	ns	ns	.037	ns	(.087)	.016
Mode (AO/TC)	.048	ns	ns	.020	ns	ns	.020	ns	ns
H-I Prog	ns	ns	.020	(.088)	(.089)	ns	.053	.030	(.065)
First Prog	ns	ns	.026	ns	ns	ns	ns	ns	ns
Parent Trng	ns	(.103)	(.061)	ns	(.089)	ns	ns	(.080)	ns
Reg Prog (covariate)	ns	ns	ns	ns	ns	ns	ns	ns	ns
Interactions[b]									
UPTA X H-I Type	.045	.004	ns	ns	.009	.001	ns	.014	.000
UPTA X First Prog	ns	.033	(.058)	ns	(.091)	ns	ns	(.071)	ns
UPTA X Par Trng	ns	ns	.021	.028	ns	ns	ns	ns	ns
WISC X H-I Type	ns	ns	.044	ns	ns	(.096)	ns	.027	ns
WISC X First Prog	(.095)	ns	ns	(.086)	ns	ns	ns	ns	ns
WISC X Mode	ns	ns	.035	ns	ns	ns	ns	ns	ns
Mode X H-I Type	ns	(.069)	ns	(.082)	.047	ns	.022	.011	.026
Mode X First Prog	ns	.010	.049	ns	.038	ns	ns	.015	ns
Mode X Par Trng	ns	.045	.000	ns	.046	ns	ns	(.063)	ns
H-I X First Prog	ns	ns	.017	ns	ns	.028	ns	ns	.003
H-I X Par Trng	ns	ns	ns	ns	ns	ns	ns	.027	ns
First Prog X Par Trng	ns	(.079)	ns	ns	ns	ns	.049	ns	ns
Mode[c] (A/AO/TC)	(.103)	ns	ns	.048	ns	ns	.036	ns	ns

[a]See note a, table 6.3.

[b]See note b, table 6.3.

[c]See note c, table 6.3.

Table 6.23
Analyses of Variance on Expressive Vocabulary - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1 n	Round 1 Mean	Round 1 Unadjusted Deviation	Round 1 Adjusted Deviation	Round 2 n	Round 2 Mean	Round 2 Unadjusted Deviation	Round 2 Adjusted Deviation	Round 3 n	Round 3 Mean	Round 3 Unadjusted Deviation	Round 3 Adjusted Deviation
Grand mean	103	8.61			113	13.69			119	21.70		
UPTA												
1. ≤90	28	11.14	2.53	2.60[a]	30	15.87	2.18	2.29	30	21.83	0.14	-0.03
2. 91-100	25	9.20	0.59	1.74	29	14.83	1.14	0.71	31	21.90	0.21	-0.09
3. ≥101	50	6.90	-1.71	-2.33	54	11.87	-1.82	-1.66	58	21.52	-0.18	-0.06
WISC												
1. ≤109	49	7.53	-1.08	-1.40	51	12.57	-1.12	-1.68	59	21.22	-0.48	-0.75
2. 110+	54	9.59	0.98	1.27	62	14.61	0.92	1.38	60	22.17	0.47	0.74
Mode												
1. A/O	75	8.39	-0.22	-0.08	72	14.11	0.42	-0.33	69	22.03	0.33	0.10
2 TC	28	9.21	0.60	2.62	41	12.95	-0.74	0.58	50	21.24	-0.46	-0.14
H-I Prog												
1. Indiv.	55	8.45	-0.16	-0.85	45	13.56	-0.13	0.86	38	21.32	-0.38	-0.40
2. Group	48	8.79	0.18	0.97	68	13.78	0.09	-0.57	81	21.88	0.18	0.19
First Prog.												
1. Early	45	8.27	-0.34	-0.55	47	13.02	-0.67	0.32	49	21.08	-0.62	-0.31
2. Late	58	8.88	0.27	0.43	66	14.17	0.48	-0.22	70	22.13	0.43	0.21
Parent Trng												
1. No	26	7.85	-0.77	-1.39	33	12.39	-1.30	-1.18	34	21.15	-0.55	-0.46
2. Yes	77	8.87	0.26	0.47	80	14.23	0.53	0.49	85	21.92	0.22	0.19
Mode[b]												
1. Auditory	21	7.71	-0.81	-2.20	18	13.39	-0.25	1.28	16	21.94	0.19	0.47
2. Oral	55	8.49	-0.04	-0.43	55	14.47	0.84	-0.82	58	22.14	0.39	-0.01
3. TC	28	9.21	0.69	2.49	42	12.64	-0.99	0.53	50	21.14	-0.51	-0.13
MULTIPLE R SQUARED			.195		.527						.298	
MULTIPLE R			.442		.726						.546	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.24
Analyses of Variance on Receptive Vocabulary - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1 n	Round 1 Mean	Round 1 Unadjusted Deviation	Round 1 Adjusted Deviation	Round 2 n	Round 2 Mean	Round 2 Unadjusted Deviation	Round 2 Adjusted Deviation	Round 3 n	Round 3 Mean	Round 3 Unadjusted Deviation	Round 3 Adjusted Deviation
Grand mean	103	9.55			113	14.20			119	20.18		
UPTA												
1. <90	28	11.86	2.30	2.84[a]	30	15.97	1.76	2.11	30	21.10	0.92	0.70
2. 91-100	25	9.44	-0.11	0.74	29	14.66	0.45	0.09	31	20.65	0.46	0.27
3. ≥101	50	8.32	-1.23	-1.96	54	12.98	-1.22	-1.22	58	19.47	-0.72	-0.51
WISC												
1. ≤109	49	8.76	-0.80	-1.07	51	13.61	-0.60	-1.06	59	19.42	-0.76	-0.98
2. 110+	54	10.28	0.72	0.97	62	14.67	0.49	0.88	60	20.93	0.75	0.96
Mode												
1. A/O	75	9.17	-0.38	-0.90	72	14.50	0.30	-0.26	69	20.57	0.38	-0.15
2 TC	28	10.57	1.02	2.41	41	13.68	-0.52	0.46	50	19.66	-0.52	0.20
H-I Prog												
1. Indiv.	55	9.16	-0.39	-0.86	45	13.71	-0.49	0.43	38	20.79	0.60	0.70
2. Group	48	10.00	0.45	0.99	68	14.53	0.33	-0.28	81	19.90	-0.28	-0.33
First Prog.												
1. Early	45	9.91	0.36	0.47	47	14.02	-0.18	0.62	49	19.98	-0.21	0.34
2. Late	58	9.28	-0.28	-0.36	66	14.33	0.13	-0.44	70	20.33	0.14	-0.24
Parent Trng												
1. No	26	9.23	-0.32	-1.11	33	12.91	-1.29	-1.26	34	20.26	0.08	0.63
2. Yes	77	9.66	0.11	0.38	80	14.74	0.53	0.52	85	20.15	-0.03	-0.25
Mode[b]												
1. Auditory	21	8.33	-1.14	-2.01	18	13.17	-0.96	-0.30	16	21.44	1.03	1.60
2. Oral	55	9.35	-0.13	-0.48	55	14.96	0.83	-0.42	58	20.53	0.35	-0.43
3. TC	28	10.57	1.10	2.45	42	13.45	-0.68	0.43	50	19.66	-0.64	-0.01
MULTIPLE R SQUARED			.186				.394				.211	
MULTIPLE R			.432				.628				.459	

[a]The adjusted deviations that are significant are underlined.

[b]These results are from the separate analyses that were done using the three categories of communication mode.

Table 6.25
Analyses of Variance on Receptive Total - Means and Deviation
(Hearing Parents Only)

Predictor Variables	Round 1 n	Round 1 Mean	Round 1 Unadjusted Deviation	Round 1 Adjusted Deviation	Round 2 n	Round 2 Mean	Round 2 Unadjusted Deviation	Round 2 Adjusted Deviation	Round 3 n	Round 3 Mean	Round 3 Unadjusted Deviation	Round 3 Adjusted Deviation
Grand mean	103	16.21			113	23.72			119	34.71		
UPTA												
1. <90	28	19.68	3.46	4.09[a]	30	27.33	3.62	3.91	30	35.90	1.19	1.01
2. 91-100	25	16.60	0.39	2.08	29	24.52	0.80	0.15	31	35.42	0.71	0.37
3. ≥101	50	14.08	-2.13	-3.33	54	21.28	-2.44	-2.25	58	33.72	-0.99	-0.72
WISC												
1. ≤109	49	14.73	-1.48	-2.10	51	21.96	-1.76	-2.63	59	33.39	-1.32	-2.22
2. 110+	54	17.76	1.34	1.90	62	25.16	1.44	2.16	60	36.02	1.30	2.19
Mode												
1. A/O	75	15.63	-0.59	-1.62	72	24.42	0.70	-0.36	69	35.33	0.62	-0.18
2 TC	28	17.79	1.57	4.34	41	22.49	-1.23	0.63	50	33.86	-0.85	0.24
H-I Prog												
1. Indiv.	55	15.49	-0.72	-1.74	45	22.84	-0.87	0.58	38	34.34	-0.37	0.34
2. Group	48	17.04	0.83	1.99	68	24.29	0.58	-0.39	81	34.89	0.17	-0.16
First Prog.												
1. Early	45	16.31	0.10	-0.06	47	22.98	-0.74	0.79	49	33.86	-0.86	0.48
2. Late	58	16.14	-0.08	0.04	66	24.24	0.53	-0.56	70	35.31	0.60	-0.33
Parent Trng												
1. No	26	15.00	-1.21	-2.63	33	21.52	-2.20	-2.05	34	35.47	0.76	1.67
2. Yes	77	16.62	0.41	0.89	80	24.63	0.91	0.84	85	34.41	-0.30	-0.67
Mode[b]												
1. Auditory	21	13.81	-2.26	-4.31	18	21.67	-1.93	0.28	16	35.13	-0.21	1.82
2. Oral	55	16.05	-0.01	-0.54	55	25.42	1.82	-0.56	58	35.78	0.86	-0.50
3. TC	28	17.79	1.72	4.28	42	22.05	-1.55	0.61	50	33.86	-1.06	0.00
MULTIPLE R SQUARED			.208				.491				.369	
MULTIPLE R			.456				.701				.608	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

between program type and communication mode showed that total communication children did better in group than in individual programs, whereas auditory and auditory/oral children did better in individual programs. These results mirror the findings for LAB.

There were a number of interactions in rounds 2 and 3 involving program type. On the two receptive scores in rounds 2 and 3, there were interactions between program type and hearing loss, showing that group programs were more effective than individual programs for children with severe losses.

Interactions in round 3 between program type and age of first program showed that the highest scores were obtained by children in individual programs who had begun their education relatively late. Further findings confirm the advantage for late program start. There was a significant overall effect for late programming on expressive vocabulary in round 3, plus a series of interactions in rounds 2 and 3. On all three measures in round 2, and on expressive vocabulary in round 3, the highest scores were obtained by late children with severe losses. In round 1, on both expressive and receptive vocabulary, high-IQ children did better if they began programming late. Low-IQ children, on the other hand, did better if they were early starters.

On all three measures in round 2, and on expressive vocabulary in round 3, there was an advantage for late programming among the combined auditory and auditory/oral children. Total communication children, on the other hand, did better if they began their education early.

Findings related to parent training are likewise inconsistent and difficult to interpret. In round 1, early programming led to better receptive total scores for children *not* receiving formal training from their parents. In round 2, late programming had an advantage, this time on expressive vocabulary development for children not trained formally by their parents.

Other findings do support the value of formal parent training, although not for all groups of children and not very strongly. Four marginally significant effects -- all three measures in round 2 and expressive vocabulary in round 3 -- showed that children receiving formal training did better. The round 2 receptive total score showed an advantage for formally trained children, especially those in segregated classes.

Two interactions of parent training with hearing loss (receptive vocabulary in round 1 and expressive vocabulary in round 3) showed that children with low- and high- profound losses did better if trained, while those with severe losses did better without training.

There were four significant interactions with mode, showing that auditory and auditory/oral children did better with parent training. In fact, these children scored higher than both auditory and auditory/oral children without parent training, and total communication children regardless of parent training.

There were no effects associated with integration.

6.6. SUMMARY

The pattern of findings related to language development is neither simple nor totally consistent. The data showed complex relationships among child characteristics -- such as hearing loss, and IQ -- and the educational variables -- communication mode, program type, parent training, and so on. Many of the results were detected not in overall differences among groups but in interactions among variables. Not all of the significant findings have been discussed. In particular, a number of isolated interactions have been omitted. What we have done is to present patterns from the data that showed some consistency. Among the patterns emphasized were the consistent and important effects for age, hearing loss, and intelligence. Effects for communication mode were found on almost all measures, but the direction of the effect varied with the particular skill being assessed.

No overall effects were found for program type; effects varied with the measure and the characteristics of the child. In general, individual programs were more effective than group programs for developing speech. On LAB and the mother-child measures, individual programs were more effective for auditory and auditory/oral children; group programs, for children in total communication programs.

There was a surprising pattern found for age of first program: late starters were generally found to have an advantage. It is similarly unexpected that parent training did not emerge as a strong variable. Formal parent training was only associated with better performance on the mother-child interaction measures. Even within the mother-child dyad, the effect of parent training varied with the characteristics of the child and the type of educational program in which the child was enrolled. Limitations on these measures must be kept in mind: "late" starters were children beginning their program after 18 months of age, and the quality of parent training was not assessed.

On all measures there was a consistent and surprising lack of effect for integration. In fact, this variable emerged as the least important of all.

Chapter 7
THE DEVELOPMENT OF ACADEMIC SKILLS

Measures of academic growth were included in the study because academic skills were thought to be important. The results, however can be considered only tentative, given the youth of the children and the early stage of their school careers.

The measures used were the *Gates-McGinitie* test of reading achievement and a mathematics test especially compiled for this study. The Gates test yields two measures of reading achievement -- vocabulary and reading comprehension -- which are scored in grade equivalents. Within the sample, the two tests correlated highly with each other: $r = .87$.

The mathematics test is composed of seven subtests. With the exception of copying numbers subtest, on which almost all of the children achieved perfect scores, the seven subscores correlated highly with each other -- from .48 to .92. The scores from five of the subtests -- copying numbers, writing numbers, number sequences, rational counting, and one-to-one correspondence -- were summed to produce a basic-concepts score. There were two other subtests -- the computation sections from the Primer and Primary I forms of the Metropolitan Achievement Test in mathematics. Results on these two tests were summed to produce a computation score. The two subtotals were in turn summed to yield a total math score.

Scores on the academic measures showed moderate relationships to the LAB and mother-child measures. Correlations between the two reading tests and LAB ranged from .38 to .45; correlations between the reading and mother-child measures ranged from .35 to .51. Correlations of the math scores with LAB ranged from .51 to .53, and with mother-child measures, from .48 to .62.

The academic measures were less closely related to speech. The correlations between reading and speech ranged from .25 to .35, and between mathematics and speech, from .27 to .42.

Stronger relationships might have been expected, especially between reading and the other language measures. The finding of only moderate relationships suggests that reading in young deaf children develops in relative independence from non-print modes of communication. Reading certainly appears to be independent from speech, which suggests that deaf children can learn to read using a strategy that does not involve decoding to speech.

Our findings thus support the use of teaching strategies based on the whole word approach as well as strategies that go directly to meaning (Dodds, 1982).

These findings may also reflect the emphasis, in reading tests for this age group, on letter and word identification -- tasks that rely heavily on visual skills rather than knowledge of complex linguistic relationships.

Table 7.1 gives the reading and mathematics scores by age. The scores increased regularly with age, demonstrating that the tests are developmental.

The scores on the tests showed that the children were generally progressing well. On vocabulary reading, seven-year-olds scored an average grade equivalent of 1.9. This is roughly where hearing seven-year-olds, who normally are finishing Grade 1, would be expected to score. Eight-year-olds, who would normally be finishing Grade 2, did less well than would be expected, averaging only 2.1.

There was a similar pattern in reading comprehension. Seven-year-olds scored on target with a mean grade equivalent of 1.8, and eight-years-olds did only slightly better at 1.9. These findings are consistent with those of other studies, which have found that the development of reading in hearing impaired children tends to plateau. This plateau in test scores may reflect, in part, a shift in the focus of reading tests from visual to linguistic skills.

Scores on the mathematics tests showed that the children as a group had mastered basic number concepts and were just beginning to develop computation skills. The average score on copying numbers was 9.7 out of 10. This is really a screening test used to ensure that children have the minimal skills necessary to proceed with the test. Almost all of the children succeeded in copying the numbers from 1 to 10 correctly. The average score for writing numbers from 1 to 20 was also high - 12.3 out of 15. Scores on number sequences, rational counting, and one-to-one correspondance were lower but still indicated basic competence in the skills assessed. Overall, the mean basic-concepts score was 32.8 out of 44 items.

Of the 43 items on the computation section of the math test, which were drawn from tests designed for Kindergarten and Grade 1, the seven-year-olds in the sample averaged 16 problems correct. Eight-year-olds scored slightly higher, with 22 items correct. It is difficult to evaluate these results because it was not possible to administer the total Metropolitan test and use the standardized scores. The average scores, however, do indicate that the children were acquiring competence in these skill areas.

Tables 7.2 to 7.4 present the results of the analyses of variance on the academic scores. Relatively few effects were found. Age had a consistent effect on all measures. Hearing loss affected all scores, but there was not the consistent decline over the three hearing levels that was seen in the language measures. Here children with low-profound losses did roughly as well as those with severe losses, while those in the high-profound category scored lower.

Table 7.1

Mean Academic Scores by Age: Round 3

		Age				
		5	6	7	8	Total
Reading	(n)	(7)	(21)	(67)	(30)	(125)
Vocabulary		.91[a]	1.11	1.86	2.11	1.74
Comprehension		.13	1.05	1.75	1.90	1.61
Mathematics	(n)	(13)	(30)	(69)	(31)	(143)
Copying Numbers		9.69[b]	9.27	10.00	9.68	9.75
Writing Numbers		7.54	9.73	13.36	14.20	12.25
No. Sequences		1.39	2.37	4.09	4.44	3.56
Rational Counting		1.38	2.10	5.07	6.32	4.38
One-to-one Corr.		1.07	1.77	3.30	4.09	2.95
BASIC CONCEPTS		21.08	24.90	35.83	38.42	32.76
Primary Computation		.46	2.37	8.46	10.71	6.94
Elementary Computation		.00	.87	7.61	12.35	6.53
COMPUTATION		.46	3.20	16.07	23.06	13.47
TOTAL MATH		21.46	28.13	51.90	61.49	46.22

Note: Scores on this measure improved significantly with age ($p < .01$).

[a] Grade equivalent.

[b] Number correct.

Intelligence had a marginally significant or significant effect on all academic measures, with the exception of vocabulary.

There were few effects for program variables. Communication mode affected the computation subscore in math, with non-manual children scoring higher. Auditory/oral children scored somewhat higher in computation than those in auditory programs, although the differences were small. Communication mode had no effect on reading achievement. Program type had marginally significant effects on the computation and total mathematics scores, with children in group programs scoring higher.

The superiority of late age of first program appeared in these data, too. Late program starters scored higher on reading comprehension, computation, and total math. Children trained informally by their parents also showed an advantage on total math over children trained formally.

There were no effects associated with integration.

These data do not show the strong effects found with the other measures. The effects that were found, however, are generally consistent with those described in chapter 6. The lack of effects probably reflects the young age of the children and their having just begun their academic careers. More useful information on the factors influencing academic development would be obtained by following these children into the higher grades.

Table 7.2

Analyses of Variance on Academic Measures - Significance Levels
(Hearing Parents Only: n = 104)

Predictor Variables	Reading		Mathematics		
	Vocabulary	Comprehension	Basic Concepts	Computation	Total
Age (Covariate)	.000	.000	.000	.000	.000
UPTA	.042	.021	.021	.000	.000
WISC	ns	(.070)	(.084)	.015	.018
Mode (AO/TC)	ns	ns	ns	.009	ns
H-I Prog	ns	ns	ns	(.093)	(.083)
First Prog	ns	.043	ns	(.103)	(.073)
Parent Trng	ns	ns	ns	ns	(.070)
Reg Prog (Covariate)	ns	ns	ns	ns	ns
Interactions					
Mode X H-I Type	ns	ns	0.05	ns	ns
Mode (A/AO/TC)	ns	ns	ns	.011	ns

Table 7.3

Analyses of Variance on Reading - Means and Deviations

(Hearing Parents only: n = 104)

Predictor Variables	Vocabulary				Comprehension			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	109	1.72			104	1.55		
UPTA								
1. < 90	26	1.84	0.14	0.18[a]	26	1.60	0.05	0.06
2. 91-100	29	1.88	0.18	0.15	29	1.79	0.25	0.22
3. ≥ 101	49	1.53	-0.18	-0.19	49	1.38	-0.17	-0.16
WISC								
1. ≤ 109	54	1.58	-0.12	-0.19	54	1.42	-0.13	-0.20
2. 110+	50	1.84	0.13	0.20	50	1.69	0.14	0.22
Mode								
1. A/O	64	1.71	0.01	-0.09	64	1.57	0.02	-0.05
2. TC	40	1.69	-0.02	0.15	40	1.51	-0.04	0.07
H-I Prog								
1. Indiv.	30	1.77	0.07	0.10	30	1.48	-0.07	-0.11
2. Group	74	1.68	-0.03	-0.04	74	1.58	0.03	0.05
First Prog.								
1. Early	42	1.60	-0.11	-0.02	42	1.39	-0.16	-0.08
2. Late	62	1.78	0.07	0.01	62	1.65	0.11	0.06
Parent Trng								
1. No	31	1.58	-0.12	0.05	31	1.45	-0.10	0.02
2. Yes	73	1.76	0.05	-0.02	73	1.59	0.04	0.01
Mode[b]								
1. Auditory	21	1.90	0.18	0.10	21	1.59	0.02	-0.07
2. Oral	48	1.66	-0.05	-0.13	48	1.62	0.05	-0.03
3. TC	40	1.69	-0.03	0.10	40	1.51	-0.06	0.07
MULTIPLE R SQUARED			.394				.381	
MULTIPLE R			.628				.617	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table 7.4

Analyses of Variance on Mathematics Scores - Means and Deviations
(Hearing Parents Only: n = 104)

Predictor Variabiles	Basic Concepts				Computation				Total			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	104	35.35			104	14.83			104	50.17		
UPTA												
1. < 90	26	36.69	1.35	1.26[a]	26	18.35	3.52	2.37	26	55.04	4.87	3.63
2. 91-100	29	37.55	2.21	1.80	29	19.55	4.72	3.03	29	57.14	6.96	4.87
3. ≥ 101	49	33.33	-2.02	-1.73	49	10.16	-4.66	-3.05	49	43.47	-6.70	-4.81
WISC												
1. ≤ 109	54	33.93	-1.42	-1.98	54	11.93	-2.90	-3.07	54	45.85	-4.32	-5.05
2. 110+	50	36.88	1.53	2.14	50	17.96	3.13	3.31	50	54.84	4.67	5.46
Mode												
1. A/O	64	36.00	0.65	-0.07	64	18.41	3.58	2.26	64	54.41	4.23	2.19
2. TC	40	34.30	-1.05	0.11	40	9.10	-5.73	-3.62	40	43.40	-6.77	-3.51
H-I Prog												
1. Indiv.	30	35.03	-0.31	-1.13	30	16.07	1.24	-0.74	30	51.10	0.93	-1.85
2. Group	74	35.47	0.13	0.46	74	14.32	-0.50	0.30	74	49.80	-0.38	0.75
First Prog.												
1. Early	42	33.88	-1.47	-0.57	42	12.50	-2.33	-0.75	42	46.38	-3.79	-1.31
2. Late	62	36.34	0.99	0.39	62	16.40	1.58	0.51	62	52.74	2.57	0.89
Parent Trng												
1. No	31	34.26	-1.09	0.36	31	10.39	-4.44	-0.22	31	44.68	-5.50	0.18
2. Yes	73	35.81	0.46	-0.15	73	16.71	1.89	0.09	73	52.51	2.33	-0.08
Mode[b]												
1. Auditory	21	35.05	-0.21	-1.01	21	17.38	2.50	1.26	21	52.43	2.29	0.25
2. Oral	48	36.15	0.89	0.17	48	18.60	3.72	2.56	48	54.75	4.61	2.73
3. TC	40	34.30	-0.96	0.32	40	9.10	-5.78	-3.73	40	43.40	-6.74	-3.40
MULTIPLE R. SQUARED			.314				.530					
MULTIPLE R			.560				.728					

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Chapter 8
SOCIAL DEVELOPMENT

The social development scale used in the study yields three subscale scores -- self help, social relations, and social comprehension -- as well as a total score. Table 8.1 gives the scores on each of these scales by age. The results show that the scales did tap skills that developed systematically over this age period.

The next set of tables summarizes the results of the analyses of variance on social development. Table 8.2 gives the significance levels for each of the factors, and tables 8.3 through 8.6 present the deviation scores.

The analyses of variance confirm the consistent increase in scores with age that was noted in table 8.1. Age had significant effects on all scores in all rounds.

In contrast to language, social development was not affected by hearing loss. This is an interesting finding and shows that young deaf children can develop social skills through means other than speech. It also suggests that the scale is valid as a low-verbal tool. Obviously, social interaction requires communication of some type. The items were constructed, however, so that children received credit for items regardless of whether they performed the tasks verbally or non-verbally. We thus assessed social development in a manner that was independent of language. The results are similar to those of Furth, who assessed the intelligence of deaf children independently of language and found normal levels of functioning (Furth, 1971).

Surprisingly, IQ did not have a consistent effect on social development. There was only one, marginally significant effect in round 1, and none in round 2. In round 3, however, there were one significant and two marginally significant effects for IQ. It must be recalled that the sample as a whole had average or above average intelligence. It is probably true that intelligence markedly below average depresses development in this area. It is also possible that differences in intelligence become important later in the development of hearing-impaired children, when the skills to be acquired are more complex.

There were numerous significant effects for communication mode, but they did not show a consistent pattern. There was only one, marginally significant difference between total communication and the combined auditory-auditory/oral group. There were, however, differences when the three groups were compared. In round 1, children in total

Table 8.1

A. Mean Self Help Scores by Age

Round	Age						
	3	4	5	6	7	8	Total
1	20.50	24.86	27.12	27.43	-	-	24.99
2	-	24.43	27.89	30.36	30.33	33.00	27.83
3	-	-	28.21	29.97	31.61	31.97	30.79

B. Mean Social Relations Scores by Age

Round	Age						
	3	4	5	6	7	8	Total
1	23.27	29.11	32.80	33.81	-	-	29.82
2	-	28.21	34.50	35.80	42.78	44.00	33.68
3	-	-	38.79	37.97	41.81	43.31	40.96

C. Mean Social Comprehension Scores by Age

Round	Age						
	3	4	5	6	7	8	Total
1	16.64	22.55	27.08	31.53	-	-	23.94
2	-	23.79	28.65	32.25	38.89	45.00	29.07
3	-	-	33.29	34.60	38.18	39.97	37.25

D. Mean Social Development Total Scores by Age

Round	Age						
	3	4	5	6	7	8	Total
1	59.23	76.52	87.00	90.81	-	-	78.21
2	-	76.43	91.04	98.41	112.00	122.00	90.57
3	-	-	100.29	102.53	110.43	115.24	107.91

Table 8.2

Analyses of Variance on Social Development - Significance Levels
(Hearing Parents Only: n = 121)

Predictor Variables	Self Help			Social Relations			Social Comprehension			Total Score		
	Rnd 1	Rnd 2	Rnd 3	Rnd 1	Rnd 2	Rnd 3	Rnd 1	Rnd 2	Rnd 3	Rnd 1	Rnd 2	Rnd 3
Age (Covariate)	.000	.006	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000
UPTA	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
WISC	(.063)[a]	ns	ns	ns	ns	(.063)	ns	ns	.031	ns	ns	(.089)
Mode (AO/TC)	ns	ns	ns	ns	ns	ns	(.066)	ns	ns	ns	ns	ns
H-I Prog	.027	.016	ns	.012	(.088)	ns	.000	ns	ns	.002	(.086)	ns
First Prog	.005	ns	ns	ns	ns	ns	ns	ns	ns	.052	ns	ns
Parent Trng	ns	ns	ns	ns	.040	ns	ns	(.067)	ns	ns	(.103)	ns
Reg. Prog (Covariate)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Interactions[b]												
UPTA X WISC	.047	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
UPTA X Mode	ns	ns	ns	ns	ns	(.080)	ns	ns	ns	ns	ns	ns
UPTA X H-I Type	.019	.042	ns	(.093)	.013	ns	ns	.002	.020	(.076)	.002	ns
WISC X H-I Type	ns	ns	ns	ns	ns	ns	ns	ns	(.059)	ns	ns	ns
Mode X H-I Type	.049	ns	ns	ns	ns	ns	ns	ns	ns	(.091)	(.065)	ns
H-I X First Prog	ns	ns	ns	ns	.035	ns	.026	.038	.008	ns	.027	(.102)
Mode (A/AO/TC)	.036	.051	ns	.047	ns	ns	.000	ns	ns	.036	ns	ns

[a] Marginally significant effects are in parentheses.

[b] Includes only those interactions for which significant effects were found.

[c] Separate analyses were done using three categories of communication. This row lists the significance levels only for mode; significance levels for the other variables were similar to those obtained in the analyses using two categories of mode.

Table 8.3
Analyses of Variance on Self Help - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1				Round 2				Round 3			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	120	25.17			119	28.13			120	31.13		
UPTA												
1. ≤90	32	24.47	-0.70	-0.67	30	27.63	-0.50	-0.58	29	30.97	-0.17	0.02
2. 91-100	31	25.61	0.45	0.12	31	28.23	0.09	-0.03	32	31.25	0.12	0.08
3. ≥101	57	25.32	0.15	0.31	58	28.34	0.21	0.31	59	31.15	0.02	-0.05
WISC												
1. ≤109	59	25.95	0.78	0.09	60	28.25	0.12	-0.15	63	31.11	-0.02	-0.40
2. 110+	61	24.41	-0.78	-0.09	59	28.02	-0.12	0.16	57	31.16	0.02	0.44
Mode												
1. A/O	83	25.02	-0.14	-0.10	75	28.12	-0.01	0.11	51	31.20	-0.19	-0.33
2 TC	37	25.49	0.32	0.23	44	28.16	0.02	-0.19	69	31.09	0.25	0.43
H-I Prog												
1. Indiv.	60	24.27	-0.90	0.27[a]	47	27.02	-1.11	-0.89	33	31.18	-0.30	0.31
2. Group	60	26.07	0.90	-0.27	72	28.86	0.73	0.58	87	31.11	0.13	-0.14
First Prog.												
1. Early	53	23.94	-1.22	-0.91	53	27.94	-0.19	0.08	68	30.94	0.06	-0.24
2. Late	67	26.13	0.97	0.72	66	28.29	0.15	-0.07	52	31.38	-0.05	0.18
Parent Trng												
1. No	31	25.35	0.19	-0.01	33	27.76	-0.38	-0.52	37	30.84	0.05	0.18
2. Yes	89	25.10	-0.07	0.00	86	28.28	0.14	0.20	83	31.27	-0.02	-0.07
Mode[b]												
1. Auditory	22	22.86	-2.29	-0.60	18	26.39	-1.80	-1.28	16	30.19	-0.98	-0.44
2. Oral	63	25.57	0.42	-0.05	58	28.74	0.55	0.39	57	31.25	0.08	-0.22
3. TC	36	25.81	0.66	0.46	45	28.20	0.01	0.01	52	31.38	0.22	0.38
MULTIPLE R SQUARED			.308				.137				.141	
MULTIPLE R			.555				.370				.376	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table - 8.4

Analyses of Variance on Social Relations - Means and Deviations
(Hearing Parents Only)

Predictor Variables	Round 1				Round 2				Round 3			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand Mean	119	24.66			119	27.62			119	33.39		
UPTA												
1. < 90	32	25.00	0.34	0.84	30	28.30	0.68	0.66	29	33.90	0.51	0.51
2. 91-100	31	24.65	-0.02	-0.28	31	27.19	-0.43	-1.10	32	32.94	-0.45	-0.90
3. ≥ 101	56	24.48	-0.18	-0.32	58	27.50	-0.12	0.25	58	33.38	-0.01	0.24
WISC												
1. ≤ 109	59	24.88	0.22	-0.45	60	27.05	-0.57	-0.80	62	32.68	-0.71	-1.05
2. 110+	60	24.45	-0.21	0.45	59	28.20	0.58	0.82	57	34.16	0.77	1.14
Mode												
1. A/O	83	24.45	-0.22	-0.45	75	27.97	0.35	0.20	67	33.70	0.31	0.16
2. TC	36	25.17	0.50	1.03	44	27.04	-0.60	-0.35	52	32.98	-0.41	-0.20
H-I Prog												
1. Indiv.	59	23.44	-1.22	-0.23[a]	47	26.81	-0.81	-0.40	37	33.08	-0.31	-0.22
2. Group	60	25.87	1.20	0.22	72	28.15	0.53	0.26	82	33.52	0.14	0.10
First Prog.												
1. Early	52	24.40	-0.26	0.02	53	27.85	0.23	0.45	51	33.35	-0.03	0.12
2. Late	67	24.87	0.20	-0.01	66	27.44	-0.18	-0.36	68	33.41	0.03	-0.09
Parent Trng												
1. No	31	23.71	-0.95	-1.30	33	26.15	-1.47	-1.44	33	32.42	-0.96	-0.80
2. Yes	88	25.00	0.34	0.46	86	28.19	0.56	0.55	86	33.76	0.37	0.31
Mode[b]												
1. Auditory	22	26.95	-2.79	-0.65	18	32.83	-0.70	-0.52	16	41.06	0.18	0.87
2. Oral	63	30.13	0.39	-0.42	58	34.24	0.71	0.15	56	41.23	0.35	-0.23
3. TC	35	30.80	1.06	1.16	45	32.89	-0.64	-0.41	52	40.44	-0.44	-0.02
MULTIPLE R SQUARED			.227				.174				.165	
MULTIPLE R			.476				.417				.406	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table - 8.5

Analyses of Variance on Social Comprehension - Means and Deviations
(Hearing Parents only)

Predictor Variables	Round 1				Round 2				Round 3			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	118	23.81			119	28.75			119	36.91		
UPTA												
1. < 90	32	23.72	-0.09	0.47	30	29.70	0.95	1.09	29	37.28	0.37	0.29
2. 91-100	30	24.93	1.13	1.21	31	27.58	-1.17	-2.01	32	37.53	0.62	0.22
3. ≥ 101	56	23.25	-0.56	-0.92	58	28.88	0.13	0.51	58	36.38	-0.53	-0.26
WISC												
1. ≤ 109	59	24.36	0.55	-0.71	60	28.22	-0.53	-0.92	62	35.92	-0.99	-1.58[a]
2. 110+	59	23.25	-0.55	0.71	59	29.29	0.54	0.93	57	37.98	1.07	1.72
Mode												
1. A/O	82	23.22	-0.59	-0.70	75	28.85	-0.11	0.01	67	37.36	0.45	-0.11
2. TC	36	25.14	1.33	1.59	44	28.57	0.09	-0.01	52	36.33	-0.58	0.14
H-I Prog.												
1. Indiv.	59	22.00	-1.81	-0.09	47	27.94	-1.54	-1.79	37	34.14	0.23	1.06
2. Group	59	25.61	1.81	0.09	72	29.28	0.59	0.69	82	36.80	-0.10	-0.48
First Prog.												
1. Early	51	22.84	-0.96	-0.05	53	28.64	0.11	-0.13	51	36.75	-0.16	0.26
2. Late	67	24.54	0.73	0.04	66	28.83	-0.18	0.22	68	37.03	0.12	-0.19
Parent Trng												
1. No	31	24.39	0.58	0.30	33	27.21	-0.81	0.20	33	36.42	-0.48	0.32
2. Yes	87	23.60	-0.21	-0.11	86	29.34	0.53	-0.13	86	37.09	0.19	-0.12
Mode[b]												
1. Auditory	22	20.14	-4.01	-0.64	18	29.11	-0.25	1.56	16	37.75	0.27	1.40
2. Oral	66	23.83	-0.31	-0.85	62	28.87	-0.49	-1.36	60	38.13	0.66	-0.12
3. TC	44	26.61	2.47	1.60	54	30.00	0.64	1.04	60	36.75	-0.73	-0.26
MULTIPLE R SQUARED			.439				.155				.256	
MULTIPLE R			.663				.393				.506	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

Table - 8.6

Analyses of Variance on Social Development Total - Means and Deviations
(Hearing Parents only)

Predictor Variables	Round 1				Round 2				Round 3			
	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation	n	Mean	Unadjusted Deviation	Adjusted Deviation
Grand mean	120	78.12			119	90.39			120	108.14		
UPTA												
1. ≤ 90	32	78.13	0.01	0.78	30	91.47	1.07	0.99	29	109.55	1.41	2.40
2. 91-100	31	79.52	1.40	0.60	31	88.87	-1.52	-3.23	32	109.31	1.17	1.01
3. ≥ 101	57	77.35	-0.77	-0.76	58	90.66	0.26	1.22	59	106.81	-1.33	-1.73
WISC												
1. ≤ 109	59	80.34	2.22	-0.54	60	89.68	-0.71	-1.69	63	105.81	-2.33	-3.88
2. 110+	61	75.97	-2.15	0.52	59	91.12	0.72	1.72	57	110.72	2.58	4.29
Mode												
1. A/O	83	77.53	-0.59	-0.83	75	90.81	0.42	0.28	68	108.13	-0.01	-1.63
2. TC	37	79.43	1.32	1.85	44	89.68	-0.71	-0.48	52	108.15	0.01	2.14
H-I Prog												
1. Indiv.	60	73.57	-4.55	-0.18[a]	47	87.57	-2.82	-1.06	37	108.43	0.29	2.59
2. Group	60	82.67	4.55	0.18	72	92.24	1.84	0.69	83	108.01	-0.13	-1.15
First Prog.												
1. Early	53	74.72	-3.40	-1.69	53	90.21	-0.19	0.62	51	108.61	0.47	1.33
2. Late	67	80.81	2.69	1.34	66	90.55	0.15	-0.50	69	107.80	-0.34	-0.99
Parent Trng												
1. No	31	78.87	0.75	-0.06	33	87.30	-3.09	-3.56	33	107.39	-0.75	1.06
2. Yes	89	77.85	0.26	0.01	86	91.58	1.19	1.36	87	108.43	0.28	-0.40
Mode[b]												
1. Auditory	22	69.95	-8.04	-0.78	18	88.33	-2.17	0.99	16	109.00	0.39	1.81
2. Oral	63	79.29	1.29	-1.11	58	91.81	1.31	-0.14	57	108.91	0.30	-1.80
3. TC	36	80.64	2.65	2.42	45	89.69	-0.82	-0.21	52	108.15	-0.45	1.42
MULTIPLE R SQUARED			.358				.163				.184	
MULTIPLE R			.598				.404				.429	

[a] The adjusted deviations that are significant are underlined.

[b] These results are from the separate analyses that were done using the three categories of communication mode.

communication programs scored higher than those in auditory and auditory/oral programs on all four measures. In round 2, auditory/oral children scored slightly higher on self help than those in T.C. programs, with auditory children scoring lowest. In round 3, none of the effects attained statistical significance. Auditory children, however, were ahead on three of the four measures. T.C. children were ahead on one (self help), in second place on two, and in last place on one.

The analyses of the "pure" communication groups showed that T.C. children were still significantly ahead on self help in round 3. The auditory children were again ahead on the other social development measures, although the differences were still not significant. Thus T.C. children appear to have had an initial advantage, but other groups - particularly those who were trained auditorially - caught up in subsequent years.

The overall superiority of T.C. children in the early years is also seen in a series of interactions between program type and communication mode. Self help scores in round 1 and total scores in rounds 1 and 2 were highest for total communication children in group programs.

The superiority of group programs is also seen in a number of overall effects in rounds 1 and 2. In round 1, children in individual programs scored higher on the self-help subscale. In social relations, social comprehension, and total score, however, children in group programs scored higher. Children in group programs also scored higher in round 2 on self help, social relations, and total score, although the last two effects were only marginally significant.

There was also a complex set of interactions showing the superiority of group programs for some children. We have already seen that T.C. children did better in group programs. In addition, there were six significant and one marginally significant interactions with hearing loss, showing that children with severe losses did better in group programs. Finally, a number of interactions between program type and age of first program showed that group programs were generally better for children who started their education early. Individual programs, however, were better for late starters; this is seen for social comprehension and for total scores in round 3.

There were two overall effects that showed the same general superiority of late starters that has been observed with the other measures. These occurred for self help and for total score in round 1.

There were one significant and two marginally significant effects for parent training, all in round 2. On social relations and total score, children receiving formal training scored higher. On social comprehension, children receiving only informal training from their parents scored higher.

There were no effects for integration.

The analyses of the gain scores showed few effects and no consistent trends. The summary tables are therefore omitted. There was a significant effect for hearing loss on the gain in social comprehension from round 1 to round 2. The results are difficult to interpret, however, as the smallest gains were shown by the middle category -- that is, children with low-profound losses. There were two effects for IQ, both favouring the high-intelligence group. These occurred for the gain in social comprehension and for total score in round 1 to 2 and are consistent with the effects for IQ noted on other measures.

Compared to language, social development showed few, relatively small, and inconsistent effects. It thus appears that social development is primarily determined by variables other than those investigated here -- probably variables related to complex aspects of family structure and functioning.

Chapter 9
DEAF CHILDREN OF DEAF PARENTS

Previous studies have generally found that deaf children with deaf parents are superior in language, academic, and social development to deaf children with hearing parents (see chapter 2). These findings are frequently interpreted as supporting the value of early manual communication. Similar findings have been obtained in the present study, and they support a similar interpretation. The possibility that the findings are due to the presence of fewer secondary handicaps and greater acceptance of the deaf child by deaf parents must also be kept in mind.

The current sample included, in addition to the 139 children with hearing parents, 14 children with two deaf parents. Each of the measures we used was analysed to determine whether or not there was a significant difference between these two groups. Hearing loss, level of intelligence, and age were included in the analyses in order to control for these variables. Thus, the findings reflect differences resulting from the hearing status of the parents rather than differences in these basic characteristics of the children.

Table 9.1 summarizes the findings from the language and academic measures used in the study. For each measure, the table indicates the level of significance of the difference between the two groups as well as the adjusted deviation score associated with deaf and hearing parent status. Table 9.2 presents the results for the sociai development measure.

As can be seen in table 9.1, children with hearing parents were superior on several measures of speech development. The results were not consistent, however, and the differences were small. Children with hearing parents were significantly ahead in articulation and marginally ahead on words in isolation. In addition, there were two significant and two marginally significant interactions between hearing levels and parent status (words in isolation, intelligible utterances, non-segmental aspects, and linguistic complexity). The results showed a superiority for hearing parents for children in the middle category of hearing loss.

On the LAB test, however, children with deaf parents showed a substantial advantage on both number of words and number of propositions correct in all three rounds. The size of the difference between the two groups was roughly the same as that associated with moving from one category of hearing loss to another.

Table 9.1

Performance Differences Between Children with Deaf and Hearing Parents (Language and Academic Measures)

	Significance	Grand Mean	Adjusted Deviation[a] Deaf	Hearing
Speech				
Speech Reception	ns	5.62	-.87	0.10
Words in Isolation	(.075)	10.71	-3.72	0.45
Intelligible Words	ns	37.41	-26.83	3.03
Intelligible Utterances	ns	4.14	-1.15	0.13
Articulation	.028	27.04	-6.32	0.71[b]
Non-segmental	ns	3.28	-0.66	0.07
Syllables per Utterance	ns	5.06	-2.64	0.30
Linguistic Complexity	ns	2.21	-0.40	0.04
LAB				
Total Words Correct				
Round 1	.000	15.57	7.80	-0.79
Round 2	.000	25.65	6.17	-0.67
Round 3	.004	37.79	5.20	-0.56
Total Propositions Correct				
Round 1	.002	4.02	2.57	-0.26
Round 2	.000	8.55	4.85	-0.53
Round 3	.004	16.45	4.07	-0.44
Mother-Child Communication				
Expressive Vocabulary				
Round 1	.002	8.88	5.24	-0.51
Round 2	.000	14.22	1.53	-0.18
Round 3	(.079)	21.86	0.63	-0.06
Receptive Total				
Round 1	.000	16.35	10.45	-1.01
Round 2	.000	24.41	4.22	-0.50
Round 3	.008	35.22	2.59	-0.25
Academic Measures				
Reading				
Vocabulary	ns	1.75	-0.07	0.01
Comprehension	.020	1.62	0.09	-0.01
Mathematics				
Basic Concepts	ns	32.99	-1.25	0.14
Computation	.004	13.76	0.62	-0.07
Total	.012	46.74	-0.63	0.07

[a]The adjusted deviation indicates the expected difference from the grand mean for each group, corrected for any differences between groups in hearing loss, IQ, and age.

[b]Deviation pairs that are underlined are significantly different.

The mother-child measures likewise showed substantial advantages for children of deaf parents in all three rounds. On these measures, the advantage was larger than that associated with hearing loss. In fact, on these measures it is preferable to have a high-profound loss and be the child of deaf parents than to have only a severe loss and hearing parents. In round 1, where the differences are the largest, a child having a severe loss and hearing parents averaged 18.23 on the receptive total score, whereas a child with a loss in the high-profound category and deaf parents averaged 24.89.

On the academic measures, the findings did not show a consistent pattern. There was no overall difference in vocabulary. The presence of a significant interaction between parental hearing status and IQ, however, indicates that high-IQ children with deaf parents scored higher than similar children with hearing parents. The results also showed that children with deaf parents were ahead overall on reading comprehension.

Children with hearing parents scored higher than those with deaf parents on the basic-concepts score in mathematics, although the differences are not significant. Children with deaf parents scored higher in computation. These two effects combined to produce a small but significant advantage for children with hearing parents on the total math score.

Table 9.2 presents the results of the analyses of social development. The table shows that children with hearing parents were ahead in round 1, although only the results for social relations and social comprehension reach conventional levels of significance. In round 2, children with deaf parents were significantly ahead in social relations, social comprehension, and the total score. In round 3, children with deaf parents maintained their superiority on these measures, although only the social comprehension score attained significance.

These findings on the general superiority of deaf children with deaf parents support the view that early and fluent manual communication is valuable at least for the development of language and communication skills. The findings for social development also support this view, although less strongly. That children with deaf parents were consistently ahead in social comprehension emphasizes the importance of early communication for development in areas related to language.

The findings should not be used to support the notion that simply adding signs to the language repertoire of the hearing parent will alleviate the effects of deafness. For the deaf parent, signs form part of a fluent communication and social system that is shared by other relatives and friends. This system, in turn, is but one component of a total milieu that is accepting of and attuned to the deaf child's needs.

Table 9.2

Performance Differences Between Children with Deaf and Hearing Parents
(Social Development Measures)

	Significance	Grand Mean	Adjusted Deviation[a] Deaf	Hearing
Self Help				
Round 1	ns	24.97	-3.66	0.39
Round 2	ns	27.94	-1.11	0.12
Round 3	ns	31.26	-1.27	0.12
Social Relations				
Round 1	.027	29.95	-0.47	0.05[b]
Round 2	.000	33.85	4.53	-0.47
Round 3	ns	41.04	1.25	-0.12
Social Comprehension				
Round 1	.013	23.93	-0.77	0.08
Round 2	.002	29.03	3.99	-0.42
Round 3	.028	37.42	1.85	-0.18
Grand Total				
Round 1	(.058)	78.85	-4.90	0.52
Round 2	.004	90.82	7.41	-0.78
Round 3	ns	109.72	1.83	-0.18

[a]The adjusted deviation indicates the expected difference from the grand mean for each group, corrected for any differences between groups in hearing loss, IQ and age.

[b]Deviation pairs that are underlined are significantly different.

Chapter 10
THE EXPERIENCE OF PARENTS

The contribution of parents is critical to the development of any child, but particularly to the development of children with handicaps. Information we have already presented in this report shows the extensive involvement of parents in the education and development of their deaf children.

In itself, willingness to participate in the research is indicative of parents' concern about the educational process. Recall that, of the families eligible to participate in the study, roughly 80 per cent agreed, despite the heavy time commitment involved. Of parents who initially agreed to participate, only a few did not continue until the end of the project. Ninety-five per cent said that they would participate again if asked.

Parents were motivated to participate in the study primarily by a desire to help others. When requesting parents' co-operation, the team made clear that the research was unlikely to benefit the participating child directly, because he or she would be beyond the preschool period when the study was completed. At the completion of the study, however, many families commented that they had, in fact, benefited from participation because of the opportunity it presented for reflecting on their experiences.

> (It's been a) good experience - thinking back and seeing how far we've come. It makes us rethink some things in order to answer questions, think in depth. The process has made us think more about certain aspects and now ask more questions about things we still don't understand.

> It's a worthwhile study and if it will help others down the road, then fine! At the beginning I wondered what I'd gotten myself into because of the amount of time I'd committed. (But) it's been good to take time to re-evaluate things.

> It's interesting to know that others have the same problems and that you are sharing some information that might just help someone.

> The research has dug up a lot of sensitive feelings, but we have come to live with these feelings and situations.

Quite a few parents also spontaneously commented that they would be willing to participate in a follow-up study that would extend into the later school years.

The contribution of parents is also evident in the information that has been presented

on their teaching activities. As discussed in chapter 5, 97 per cent of the parents actively tried to facilitate the language development of their child, and fully 71 per cent gave language lessons to their children at home.

As part of the study, therefore, we felt it was important to interview parents about their experiences, including their reactions to having a hearing-impaired child, and to solicit their evaluations of the educational system and their suggestions for change.

10.1. PARENTS' EXPERIENCE OF THEIR CHILD'S DEAFNESS

As discussed in chapter 5, parents first suspected a hearing loss, on average, when the child was 8 months of age, and the loss was confirmed by 18 months. This means that parents spent, on the average, 10 months alone, without clear support, in concern over their child's development.

Reflecting on that experience as part of the round 1 interview, some parents (16 per cent) reported feeling relieved when a hearing loss was actually diagnosed. It is likely that, for these parents, having confirmation of a problem and knowing its dimensions were preferable to vague suspicions and the unknown.

Most parents (81 per cent), however, reacted with feelings of depression, anger, and loss when the impairment was diagnosed. Twenty-eight per cent were evaluated as extremely negative. Most mothers (72 per cent) felt that their feelings became more positive with time. This change occurred in fewer fathers (55 per cent).

Parents in general, however, seemed to have accepted the child, if not the handicap. Most mothers (65 per cent by round 3) felt that they were as strict with the deaf child as with their other children. Fathers were more likely than mothers to be more strict (38 per cent vs. 15 per cent). Thus, the deaf child was generally reported to be treated as his or her siblings were. Mothers generally reported that the father or partner looked after the child as much as or more than he looked after the other children (89%). Ninety-four percent of the families said that the grandparents were accepting and warm towards the child.

10.2. EVALUATION OF SERVICES

Overall, parents rated their satisfaction with the educational programs as high. Over 80 per cent of the parents reported being satisfied or very satisfied with their child's progress in language and academic areas (see table 10.1, part A). Parents were somewhat less satisfied with their child's behaviour.

These responses appear to reflect parents' satisfaction with the progress children had made rather than their absolute level of development. Parents recognized that the children were generally far behind their peers in various areas of development. They also felt,

Table 10.1

Parent Evaluation of Programs and Services

A. Satisfaction With Educational Services

Level of Satisfaction	Area		
	Language	Academics	Behaviour
Very Satisfied	48	41	29
Satisfied	35	43	43
Somewhat Satisfied	15	13	25
Very Unsatisfied	2	3	3
TOTAL	100%	100%	100%

B. Accessibility of Educators

Item	Response			
	Generally Yes	Sometimes Yes	Generally No	Total
Informed re Child's Progress	66	27	7	100%
Easy to Talk to Teacher	77	15	8	100%
Free to Give Opinions	73	12	15	100%
Consulted about Programs	29	25	46	100%
Programs Responsive to Suggestions	55	44	1	100%

C. Evaluation of Audiological and Medical Services

Quality of Service	%
Excellent	14
Good	51
So-so	16
Poor	15
Very Poor	4
TOTAL	100%

however, that considerable progress had been made as a result of their own efforts and those of teachers and other professionals, and it was with this progress that parents expressed their satisfaction.

In general, parents felt that educators were accessible (table 10.1, part B). Sixty-six per cent said that they had generally been kept well informed about their child's progress. A further 27 per cent said that some programs had kept them well informed.

The vast majority felt that it was easy to talk to teachers (77 per cent) and that their opinions were accepted (73 per cent). Fifty-five per cent of the parents felt that programs were responsive to suggestions that they made, and 43 per cent felt that some programs actively encouraged their input. Twenty-nine per cent said that they were frequently or very frequently consulted about their child's program.

Parents were less satisfied with audiological and medical services. Sixty-five per cent considered them good or excellent (table 10.1, part C). Much of the dissatisfaction was due to delay by doctors in referring parents to specialists when a problem was first suspected.

10.3. RECOMMENDATIONS

As part of the interview, parents were asked for recommendations and general comments relating to any aspect of the study (see table 10.2). The data collected are somewhat difficult to evaluate, as parents were free to respond in whatever way they wished. Some parents may have expressed an idea that other parents shared but failed to indicate. Thus, the information we report can be considered only suggestive of the feelings and opinions of parents. We have chosen to present ideas that were mentioned by five or more parents and to give the number of parents expressing that idea. The numbers attached to the comment cannot be taken as indicative of the total number of parents in the sample who felt that way.

10.3.1. Attitudes toward deafness

In making recommendations, many parents commented on the importance of fostering positive attitudes towards the deaf child. As one parent said:

> Check your own attitudes towards deafness. Otherwise it can greatly and adversely affect your relationship to your child.

Fully 91 parents made comments in the area of attitudes. Many (23) expressed the feeling that the deaf child should be treated as normal.[18] For example:

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[18]Parent interviews were not taped; rather, research officers recorded brief portions of parents' responses, attempting to produce as close to a verbatim record as possible without disrupting the tempo of the interview. Thus, the quotations presented here are approximations of what parents actually said. Any differences generally reflect omissions rather than changes or substitutions.

Table 10.2

Parents' Recommendations for Improved Service

Recommendation	Number
Attitudes Towards Deafness	
Treat your deaf child as normal	23
Be patient; don't get frustrated	11
Increase public awareness	11
Other	46
Parental Responsibility	
Be assertive with professionals	13
Get several opinions	17
Contact other parents	58
Join parent advocacy groups	10
Other	5
Help in Locating Services	
Provide counsellors	12
Provide pamphlets and directories	11
Other	5
Reference Materials for Parents	
Provide unbiased and simply written material	8
Provide local reference centre	10
Other	5
Audiological Services - need to be improved	26
Communication programs recommended	
Auditory	12
Auditory/oral	4
Total communication	25
Make all options available	10
Encourage early use of hearing aids	14
Home Visiting Program	
Recommended	16
More frequent visits	9
Continue parent training for school-aged children	5
Local Programs	
Increase availability of preschool programs	17
More and better sign language programs	12
More and better qualified teachers of the deaf	9
More in-service training for regular teachers	28
More support services	14
More frequent visits by itinerant teachers	6
Improve acoustics of regular classrooms	5
Improve transition from hospital to school programs	4
Increase Financial Support to Parents	29
Miscellaneous	
Provide summer programs	7
Provide parent relief	5
Provide more contact with deaf adults	6

Treat him as a normal child - the initial feelings of upset will pass.

Remember that the child is a child first and you can't blame everything on the hearing impairment.

A number of parents counselled patience.

Some comments expressed the idea that deaf children should be treated as individuals rather than compared to so-called normal children.

I don't regard deafness as a handicap as such -- perhaps it's a lacking of something -- but really it's just a different way of being.

Always be positive. Always believe that the child can do exactly what he/she *will* do if you let him/her and support him/her.

Do what is best for your child, not what's best for you.

A number of parents (11) recognized the importance of attitudes among the general public and recommended that more public awareness programs be instituted.

10.3.2. Parental Responsibility

Many parents (45) expressed the idea that responsibility for the education of the child needs to remain with the family, rather than be relegated to professionals. A number of these (13) expressed the view that parents need to assert themselves when dealing with professionals.

Speak up. Don't sit and take advice you don't understand or agree with.

Don't be so quick to accept professionals' opinions -- their approach might not be what is *best* for *your* child. Listen to your heart and follow through with it, so you'll know you've done the best you could.

Coupled with assertiveness was the idea that parents need to search out many opinions before making their own decisions.

Never take just one person's opinion as to what to do.

New parents need to realize that responsibility for the type of program that the child has is theirs to choose -- not to let the choice rest on the professional. The first person they meet may not tell them all the options.

Get all the information and experiences you can get; then make up your own minds.

Related to this attitude are suggestions that parents should be able to consult an independent source of information about educational issues. Twelve parents felt that a

counsellor or other person should be available to serve their interests and support them in making decisions.

> ...an "Information Co-ordinator"...someone else to talk to besides the home visiting teacher, someone like a social worker or counsellor who can understand the situation.

> Provide a "counsellor" or someone who can direct the parents how to best use the "system" so they all are aware of what's available.

Some parents (11) felt that printed information would be helpful in locating services.

> There's no information available to parents on where to go, where to get services, what services are available....Maybe a pamphlet for parents on where to get services.

> Provide professionals with (a) pamphlets giving full information about various options available to parents and (b) a list of organizations concerned with deafness.

> Presently, (we are) desperately needing an organization that can disseminate unbiased information concerning *all* aspects of deafness, especially concerning communication modes and educational programming.

> Provide a centralized group able to give thorough and accurate information.

Other parents (8) were interested in having unbiased and simply written materials on educational methods available for their own use, and there were a number of suggestions (10) that local reference centres be established.

Throughout all these comments runs the theme that parents feel confused by the welter of information with which they are presented and the decisions they need to make. There is also the feeling that professionals are frequently not objective and present only one point of view.

As a counter to the bias of professionals and as a means of finding support, parents emphasized the importance of contact with other parents.

> Set up a "buddy" system of parents and put new families in touch with other parents who have a child with a similar hearing loss.

> Get into a Parent Sharing group...the opportunity to share information, unload things, and see the light at the end of the tunnel.

> Contact other parents and other children -- watch and listen and learn.

Some parents (10) also recommended joining parent advocacy groups.

10.3.3. Audiological and Medical Services.

Quite a few parents (26) felt that medical and audiological services need to be improved. Most commented on the need for earlier testing and better informed staff.

> Most doctors still don't listen to any of mother's concerns about hearing impairment.
>
> Doctors are not well-informed enough to spot hearing problems in young children and babies. Professionals don't listen to mothers...mothers have good instincts and information that can help in diagnosis.

10.3.4. Communication mode

Many parents recommended changes related to communication mode. Most of these comments (25) referred to the need for more total communication programs. There was a special concern that total communication be more available in the early years.

> Start T.C. right away....Sign language is *not* going to prevent the child from learning to speak.
>
> I would begin the use of total communication the moment I know of the deafness. Total communication should be available for preschoolers.
>
> Provide a *full-fledged* T.C. program to a child from day one, fully involving parents at this level so that both child and parent can grow up in this language together.
>
> Where you offer O/A programs you should offer T.C. programs and let the parent decide where the child should go.
>
> We would not subject our child to an auditory/oral program, the approach we followed till she was about four years of age. Our choice would be, without reservation, consistent with the philosophy of total communication (T.C.). Our daughter is not receiving a quality oral/manual communication since our own learning process is delayed by about three to four years.

Other parents (12) recommended auditory training.

> Auditory training should be considered as the primary option.
>
> Consider the auditory approach....Encourage them (parents) to stick to it.

Most parents commenting on auditory training felt that the service should be expanded.

> More funding (should be) made available for the auditory training teachers as the need dictates, especially for those areas outside of Toronto.
>
> (There is a) need for more funding for auditory training programs. The present programs are oversubscribed. (We) need auditory programs that cater to school-aged children.

As part of their concern with communication, a number of parents (14) emphasized the importance of early use of a hearing aid.

10.3.5. Home Visiting Programs

Quite a few parents (16) commented favourably about the home visiting programs.

> The home visiting teacher was such a support for *me*. I really miss her input.

> The home visiting program is *very* good. Parents need the guidance in their home, that is, how to teach and work with and communicate with their child.

Parents recommended that the service be expanded. Some (9) felt that the home visits should be more frequent. A few recommended that parent training continue for school-aged children.

10.3.6. Local Programs

The most frequently made recommendation (71 parents) was for more and better quality programs in the local community.

> Education for special needs should be available all over not just in the Metro area. Children should not be forced to go to residential school. People should be free to live where they want and *still* get good special education services for their children.

> There are not enough school programs at the local level. The child has to be bussed long distances to attend school.

Parents (17) were especially concerned with the availability of preschool programming in their local community.

> See that boards of education across the province get involved with preschoolers from birth (for educational services), not wait till five years old.

> Both separate and public schools boards should provide *local* programs for preschool children.

A number of parents (12) wished to have sign language courses made available locally or improved.

Although interested in locally available services, parents appeared to be divided on the issue of integration. One parent expressed in a letter her ideas on the value of integration.

> It is my profound belief that no one educational methodology is uniquely capable of suiting each and every child, each and every need. However, that being said, it is also my belief that hearing-impaired children should not be deprived of a chance of participating in the hearing world simply because they have a defective sense of

hearing. The Ministry of Education may become as knowledgeable and flexible as possible about the needs of children, especially under Bill 82. However, they must develop teachers who recognize the marvellous capabilities of all children, which too often far exceed your original hopes and expectations....Unfortunately, if there is one characteristic which I have seen time and again in teachers and often parents and friends of the handicapped, it is the expectation that the handicapped person cannot do this or that, should not be encouraged to try this or that, should never be expected to be independent, to talk normally, to walk, or whatever. It is sad indeed that we so quickly and determinedly chain the handicapped to our own (unhandicapped) perceptions and proceed to devise programming accordingly.

Many parents, while supporting local programs, felt that boards of education need to increase the level of support to integrated children. The writer of the letter continues:

No programming...should be implemented, whether for the child's best interests or not, where ...there is insufficient capability to fully support the program.

Some parents (9) felt that local boards of education need more or better trained teachers of the hearing impaired. Twenty-eight felt that there needs to be more in-service training for regular teachers who have deaf children in their classrooms.

Teachers in public school trying to cope with a hearing-impaired child often take the defensive stance. They need more basic education as to the needs of the hearing-impaired child so that everyone works together as a team.

Teachers in regular schools which will be having a hearing-impaired child in their class should perhaps see someone else teach them, go to observe hearing-impaired children in other classrooms....Teachers once in a while need to be supervised and tested to check that they are still able to teach well and do a good job.

Parents also felt that regular classroom teachers need more support services.

...should have a speech pathologist (therapist) available in school as part of their regular hearing-impaired program; not a speech correctionist.

Need more speech teachers...maybe one hour per day, not one hour per week...more speech training intertwined with each lesson.

Six parents felt that there should be more frequent home visits by itinerant teachers of the deaf.

Other parents concerned with supporting children in integrated settings recommended that the acoustics of regular classrooms be improved (5 parents) and that there be an improved transition from hospital to school-based programs (4 parents).

Some parents expressed strong reservations about integration.

Integration with interaction will not succeed with children who are severely or profoundly deaf. **DO NOT FORCE INTEGRATION.**

Don't close the provincial schools -- there will always be some children who need a provincial school for the level of expertise they can provide -- not all public schools will be able to cope with the deaf child.

Bill 82 won't work for the deaf; the communication barrier is too great. Although, if possible, it would be great if deaf children could be effectively serviced at the local level so that they could be at home.

Drop Bill 82. You'll never get the quality of teacher and education for hearing-impaired children in local settings.

10.3.7. Financial Support

A large number of parents (29) felt that more financial support should be available to offset the special costs of having a hearing-impaired child. Some of this concern has been ameliorated by the recent legislation providing 75 per cent funding for hearing aids. Some parents, however, said that the level of funding should be 100 per cent. Some parents were also concerned with other costs, for example, other technological aids.

10.3.8. Miscellaneous

Other recommendations were that summer programs be made available, that there be programs of parent relief, and that parents have contact with deaf adults.

Chapter 11
SUMMARY OF RESULTS AND DISCUSSION

11.1. DESCRIPTION OF THE STUDY

A longitudinal study was conducted of 153 children between three and seven years of age with severe and profound hearing losses. The children came from all programs serving this population in Ontario. The programs represented a variety of service delivery models: home visiting teachers, clinical teachers in hospitals, itinerant teachers provided by local boards of education, segregated classes in local boards, and day and residential programs in the provincial schools. The sample included 139 children with hearing parents and 14 children with two deaf parents.

Data were collected over a four year period. Each child in the study was tested extensively on three occasions during the four years. The test battery included three types of linguistic measures:

- Speech reception and production: test of speech reception, production of words in isolation, measures of connected speech production derived from Ling's Phonological Level Evaluation;
- Receptive language comprehension: measures of word and proposition comprehension from the LAB test;
- Mother-child communication: expressive and receptive measures.

The three sets of measures are increasingly inclusive and progress from assessing performance on speech alone, to assessing language whether spoken or signed, to assessing relatively natural communication whether verbal or non-verbal. The test battery also included:

- Academic performance: standardized reading and mathematics tests;
- Social development: measures of the development of self help, social relations, and social comprehension.

Extensive interviews were conducted with parents, standardized tests of intelligence were administered, and audiological information was collected.

The data were analysed for the influence of eight factors on children's development:

1. Age: 3 to 7 years;

2. Hearing loss (unaided pure tone average): severe (90 db or less), low-profound (91 to 100 db) or high-profound (101 db or greater);

3. Intelligence (WISC-R Performance Scale): low (below the median of 109) or high (at or above the median);

4. Communication mode: the predominant educational mode, whether auditory, auditory/oral, or total communication;

5. Educational program: individual or group instruction;

6. Age at initial training: early (before 18 months of age) or late (at or after 18 months of age);

7. Parent training: whether or not parents provided formal instruction at home during the early preschool years;

8. Degree of integration: cumulative hours of instruction in regular classrooms with normally hearing peers.

The data were analysed using analysis of variance, with factors 1 and 6 entered as covariates.

11.2. DESCRIPTION OF THE SAMPLE

The sample for this study included almost the entire population (80 per cent) of hearing-impaired preschoolers in Ontario. The children in the study ranged in age from three to nine years by the time of final testing. Seventy-three percent had profound losses and 97 per cent were prelingually deafened. The sample as a whole had average or above average intelligence and was roughly evenly split between the sexes (56 per cent female).

A study of the sample showed that the various program groups were heavily self selected. In addition to differences in the availability of programs from one area to another, program selection depended on the judgement of parents and educators about the suitability of various programs for various children. There was also considerable movement of children among programs during the four years of data collection, some of which reflected dissatisfaction with previous placements.

As a result of the selection process, children in various programs differed in a number of ways, including degree of hearing loss, intelligence, family economic and social status, and level of achievement. In general, children in auditory programs had more residual hearing, were above average in intelligence, and came from families with higher socio-economic status. Children in total communication programs, on the other hand, had less hearing, lower intelligence, and lower socio-economic status. Children in auditory/oral programs were generally intermediate on these dimensions.

These differences suggest that hearing loss, intelligence, and family background were important determiners of development and affected children's ability to profit from various programs.

11.3. SUMMARY OF THE FINDINGS

Our preliminary conclusion -- that background characteristics largely determined development -- was reinforced by the results of the multivariate analyses. Three measures consistently predicted the level of linguistic development. They were age, unaided hearing loss, and intelligence. Not surprisingly, children improved as they got older, and performed better the greater their level of hearing and the higher their intelligence. More significant, however, was the stability of these results over the range of educational programs studied. Despite the long-standing debate about the efficacy of various educational approaches, it appears that the overriding factors affecting the development of hearing-impaired children are background characteristics over which there is relatively little control. Educational variables are of only secondary importance and operate within the constraints imposed by age, hearing loss, and intelligence.

We will now consider each of the factors studied and summarize the effects they were found to have on development.

11.3.1. Age

Age had a significant effect on almost all measures of development. Performance of children improved with age on the receptive language measures (i.e., the LAB test of word and proposition comprehension), on all measures of mother-child communication, and on the measures of academic and social development. The only exceptions were the speech measures, where the effect of age was variable. Age did have a significant effect on the production of words in isolation. Within the connected speech measures, age significantly affected the number of non-segmental features present, the number of syllables per utterance, and linguistic complexity. Age did not significantly affect the number of intelligible words, the number of intelligible utterances or the articulation score. Age also did not affect speech reception scores.

It might be noted that syllables per utterance and linguistic complexity reflect grammatical as well as phonological development. It thus appears that, within the age range studied, age has only limited effects on speech intelligibility per se. Level of intelligibility is already fairly well established by the age of five years, which is the age of the youngest children tested on these measures. Donald Moores and his colleagues (1978) obtained similar results in their study.

11.3.2. Hearing Loss

On all linguistic measures, there was a large and consistent decline in performance over the three categories of increasing hearing loss. Children with unaided pure tone thresholds of 90 db or less performed better than those with thresholds between 91 and 100 db, who, in turn, scored higher than those with even greater losses.

There was a less consistent relationship between hearing loss and academic performance. In the case of reading and mathematics, children with high-profound losses scored lowest, but there was no consistent difference between children with severe and those with low-profound losses.

Hearing loss did not have a significant effect on social development. This is an interesting finding, one that confirms the non-verbal nature of the social development measure and indicates that social development during the preschool years can be accomplished without audition.

11.3.3. Intelligence [WISC-R Performance IQ]

The effects of intelligence were variable. Speech and receptive language (i.e., LAB) scores seemed to be most influenced by performance IQ: children with IQ scores greater than the median of 109 performed better than children scoring below the median on all speech and receptive language measures, with the exception of the LAB gain scores. Intelligence had a significant effect on only some of the mother-child measures of receptive and expressive skill.

Intelligence also had only scattered effects on academic and social development. The lack of relationship between the academic measures and IQ likely reflects the young age of the children and the fact that only rudimentary academic skills could be tested.

These three variables -- age, hearing loss, and intelligence -- had the most important effects on development. Effects of the various educational variables operated within the constraints imposed by these relatively invariant characteristics. We will now consider each of these educational variables.

11.3.4. Communication mode

Communication mode was not entirely independent of other educational factors. Although children in auditory/oral and total communication programs were found in both individual and group hearing-impaired programs, all children in auditory programs were trained individually. Likewise, some of the children in auditory/oral and total communication programs had integrated placements and some did not, but almost all of the auditory children had integrated placements. All auditory children also received formal instruction from their parents. Thus, the *auditory* program represented a combination of

aural communication, individual instruction, formal parent training, and integrated placement.

In general, there were few differences among the three program groups in curriculum or classroom structure. There was a tendency for total communication classes to include less auditory training. T.C. classes, on the other hand, tended to be more informal and to have a more positive classroom atmosphere.

Comparisons among the three program groups showed that communication mode had a complex effect on development. The effect of mode was not consistent, but varied by the area of development being considered.

In the area of speech, children in total communication programs generally performed less well than children in auditory and auditory/oral programs. This was true for four of the eight speech measures: production of words in isolation, articulation, non-segmental aspects, and linguistic complexity. Auditory children scored slightly higher than children in auditory/oral programs, although the differences were small compared to those between T.C. children and the rest of the sample.

Thus, auditory programs appear to be most effective for developing speech, followed by auditory/oral and, finally, by total communication programs. It must be kept in mind, however, that the overall level of speech skills in the sample was very low, and only a few children in the sample could produce any intelligible utterances spontaneously.

A different pattern was found for the remaining language measures. On the LAB test of receptive language ability, total communication children scored higher than the other two groups on word comprehension in all three rounds of testing. Auditory children came next, followed by those in auditory/oral programs. Communication mode also had a significant effect on the proposition comprehension scores in round 3, again favouring the total communication group, with no differences between the auditory and auditory/oral groups. Finally, total communication children made the greatest gains in proposition comprehension between rounds 2 and 3. Auditory/oral children made the smallest gains.

On the mother-child interaction measures, the total communication group was ahead on all three measures in round 1. In round 3, the auditory group was ahead, although the differences were not significant. The highest scores on mother-child interaction in round 3, however, were obtained by the small group of children who had been in total communication programs from the beginning of their educational experience, but, again, the differences were not statistically significant.

These findings derive from an analysis of the child's educational mode. Comparisons were also made among children based on the mode of communication used by the mother during the videotaped interaction. Children were assigned to three groups on the basis of their mother's observed mode: auditory/oral (speech plus natural gesture), oral/manual

(speech plus some signs), and simultaneous method (congruent and simultaneous speaking and signing/fingerspelling). Results from all three rounds showed that the simultaneous group was significantly ahead, with the oral/manual group in last place. This replicates Greenberg's (1980) finding that bimodal communication facilitates performance.

Children's educational mode had few effects on academic achievement. Auditory and auditory/oral children had higher computation scores in mathematics, but there were no differences on any of the other mathematics or reading measures. This general finding of no difference is consistent with the study by Moores and his colleagues (1978). It should be kept in mind that these achievement measures were taken at the beginning of the children's school careers, and may not represent their later educational progress.

Total communication children were ahead on all social development measures in round 1 -- an advantage that had disappeared by round 2.

It is not always possible to be certain that the differences associated with mode are caused by the mode itself. Particularly in the case of speech, the effects for mode may reflect selective placement and attrition. In Ontario, auditory and auditory/oral programs are still the first choice in most areas. Because children were placed in total communication programs only after a period of "failure", it is not valid to conclude that total communication was responsible for their poorer performance in speech. The fact that T.C. children scored higher than the other children on the receptive language and mother-child measures is strong evidence for the value of total communication in developing complex language skills.

The value of manual communication was also seen in the performance of children with deaf parents. Like the T.C. group, children with deaf parents had somewhat poorer speech than the other children. This finding differs from those of most previous studies, which have found equal or superior performance in speech among children with deaf parents. But, children with deaf parents scored higher on LAB and the mother-child interaction measures than children with hearing parents. Children with deaf parents also did better in reading, and in social development in all three rounds.

Considering all the results from the analysis of communication mode, we might conclude that auditory training is most effective for developing speech in the relatively small subgroup of deaf children who have the capacity for speech. It is important to keep in mind that the auditory program combined aural communication with formal parent training and integrated placement. For the majority of children, however, total communication appears to be the most effective means of developing complex language and communication skills. Total communication also appears to have some initial advantage in fostering social development.

In its findings of the benefits of total communication, our study is consistent with other studies, most of which have obtained similar results. This is one of the first controlled studies, however, that has obtained empirical evidence on the effectiveness of auditory programs.

11.3.5. Type of Hearing-Impaired Program

There were two general types of programs studied: those in which children were trained individually -- home visiting, hospital, and itinerant programs -- and group programs, in which children were placed in classes with other hearing-impaired children.

Like the results for communication mode, the findings relating to program type were variable and depended on the skill being measured. The data showed that children in individual programs had higher scores on several of the speech measures than those in group programs. On some of the speech measures, the advantage for individual programming occurred only for children whose losses fell into the two profound categories. Children with severe losses scored relatively high regardless of program type. Likewise it was found that individual programming had an advantage only for children in auditory and auditory/oral programs.

On the receptive language measures (LAB) in round 3, there were similar interactions between program type and communication mode. Auditory and auditory/oral children in individual programs scored higher than those receiving group instruction, whereas total communication children scored higher in group programs.

In round 1, the mother-child measures showed a fairly general advantage for group over individual programs. In rounds 2 and 3, there were again a number of interactions showing that group programs were more effective for children in total communication programs, while auditory and auditory/oral children benefited from individual instruction.

Thus, individual instruction appears to offer an advantage for speech reception and production. The effect of program type on receptive language development (i.e., LAB) and on mother-child communication depends on the communication mode being used.

Among the academic measures, group programming had an advantage for mathematics, but there were no differences in reading. Group programs were more effective for developing social skills, particularly for children in total communication programs. The analysis of social development scores indicated that group programs were more effective for children who began training early, whereas individual programs were more effective for late starters. Group programs were also found to be more effective for children with severe hearing losses, with no program differences for those with profound losses.

As was true for communication mode, the findings related to individual versus group programming may be partly due to selection. In general, we would expect that lower functioning children would be placed in group programs, while those with higher level skills would be seen individually for specialized training and placed in a regular classroom for academic work and socialization. This expectation is compatible with the findings from the speech data. It is thus intriguing to discover that group programs were more effective in developing communication and social skills, particularly for children in T.C. programs.

11.3.6. Age of first program

The findings related to age of first program are complex and interesting. They appear mainly in interaction with other factors, where a general pattern seems to emerge. On the speech measures, there were several interactions of starting age with program type. The findings indicate that children who began their training after 18 months of age, especially those in individual programs, performed better than those who began earlier.

Analysis of the LAB data showed that late starters in auditory and auditory/oral programs were ahead in language comprehension, while early starters in T.C. programs had an advantage over those beginning late. Among children in individual programs, late starters did better, while the reverse was true for children in group programs. There were also interactions between first program age and hearing loss.

Similar interactions between starting age and the other variables -- program type, communication mode, hearing loss, and intelligence -- appeared in the mother-child data. Late starters were also ahead on most of the academic measures.

The apparent superiority of late programming for some groups of children is an unexpected finding. We propose three possible explanations, each of which is an hypothesis requiring further study.

The first hypothesis is that the findings, much like those on communication mode and on program type, reflect a selection factor. It is possible that late starters did better because they were initially higher functioning and as a result their hearing impairment was detected later.

Recall that the sample had been divided into early and late starters using the median starting age of 18 months. The terms *early* and *late* are relative, and in a real sense, almost all of the children can be considered early starters. It would be useful to compare this sample with hearing-impaired children who began receiving instruction at 3 or 4 years of age. Given the comprehensive programming provisions in the province, there were very few such children in the present study. Ninety-five percent of the sample had begun instruction before 3 1/2 years of age.

A second hypothesis is that children detected early and beginning intensive programming before the age of 18 months suffer a burn out effect by age 5 or 6. This hypothesis receives some support from the fact the most of the differences associated with starting age appeared in later rounds.

The third hypothesis is based on the idea that complex linguistic and communication skills are best learned through spontaneous interaction rather than formal instruction. Early formal instruction may hinder development by reducing the amount of natural interaction. This hypothesis is relevant to the controversy in deaf education between *natural* and *formal* methods of instruction -- an issue that will be discussed further in a subsequent section.

11.3.7. Parent Training

Scattered effects for parent training suggested that formal instruction in the home was beneficial. The benefits, however, appeared to be restricted to certain groups. Low-IQ children did better in speech reception if they received formal instruction from their parents; high-IQ children did equally well regardless of whether they were instructed formally or informally. Auditory and auditory/oral children receiving formal instruction did better on some of the LAB measures, but this was not true for children in T.C. programs. Children with profound losses did better on several measures of mother-child interaction if they received formal instruction from their parents, whereas those with severe losses did better without formal training. On the mother-child interaction measures, the value of parent training depended on the age at which instruction began, as well as on program type and communication mode.

An analysis of the academic measures failed to show consistent effects. The only finding that approached significance was that children instructed informally did better on the total math score.

The results for social development were also inconsistent: children instructed formally did better in peer relationships and on total score, while those instructed informally scored higher on social comprehension.

Our analysis of the value of parent training is limited because a comparison was made only between formal and informal types of parent instruction. It was not possible to investigate the skill with which parents implemented an educational program or interacted with their children. On the speech and LAB measures we were able to explain most of the differences in performance (50 per cent to 70 per cent of the variance) among children on the basis of the variables investigated (hearing loss, intelligence, communication mode, etc.). This was not true for mother-child interaction, where only 20 to 50 per cent of the variance could be explained. Informal observations of the videotaped interactions suggested that mothers differed considerably in the skill with which they formulated messages to the child as well as in their general ability to structure the task in a meaningful way and elicit the desired responses.

Previous research on the communication skills of hearing-impaired children suggests that they are less deficient in this aspect of language development than any other, in some studies even surpassing the performance of hearing peers (e.g., Breslaw et al., 1981). Perhaps because deaf children experience such communication difficulties, they develop compensating strategies for communicative interaction.

One strategy we observed was simply the use of a number of modes. Both mothers and children, but especially children, were observed to use a variety of modes within the same interaction, including speech, gesture, signs, fingerspelling, and vocalization -- singly and in

combination. The communicative strategies of deaf children and their parents are a largely unexplored area and worthy of further investigation.

Additional evidence of the importance of parent training is that children in auditory programs came from families of higher socio-economic status. As socio-economic status is a function of occupation and level of education, it is possible that high SES parents are more effective in carrying out an educational program.

11.3.8. Degree of Integration

Despite the rising interest among parents and educators in integrating deaf children into regular schools, the data showed little difference among children on the basis of regular class experience. Integrated children were ahead on only one of the speech measures, although integration would be expected to have its greatest advantage in this area. Auditory children, who all had some integrated experience, were ahead of children in auditory/oral and total communication programs in level of speech skills. This suggests that integration, in combination with other factors such as parent training and unisensory education, forms part of an effective speech program.

Integrated children were ahead on several of the receptive language measures, but on none of the measures of mother-child interaction, academic achievement, or social development.

11.3.9. Natural versus Formal Instruction

In deaf education, there is a controversy over the relative merits of *natural* and *formal* methods of instruction. Our observations of programs in Ontario (see Chapter 4) suggested that they could be described as moderately formal in curriculum structure and highly formal in teaching style. Because of the complexity of this issue and the general consistency of Ontario programs on this dimension, it was not possible to directly compare programs of the two types. A number of findings, however, have implications for this distinction.

One is the finding that, on some measures, children did better who began instruction relatively late. These children would have spent more time learning informally and incidentally than children beginning early (see our third hypothesis in the "Age of First Program" section of this chapter). Late starters were children who would appear most able to benefit from natural language learning opportunities -- that is, children with severe as opposed to profound losses, children in auditory and auditory/oral programs, and children with higher intelligence.

Similar findings occurred for parent training: the same types of children appeared to do better if instructed informally by their parents.

These findings are consistent with a remark of Kathryn Meadow's from her early work on social development:

> The press from educators who begin to work with deaf children and their parents very early leads to over-expectations for verbal achievement and over-emphasis on the training that may or may not lead to verbal competence. This encourages in some matters a didactic, intrusive over-anxious surveillance of the deaf child's oral progress, with accompanying reduction in the relaxed playful creative happy interaction that may be necessary for normal growth and development (cited in Moores, 1978, p. 99).

Other relevant findings concern the merits of individual vs. group instruction. The data in chapter 4 showed that individual programs tended to be the most formal overall. Children in group programs, however, received the greatest amount of formal instruction, because of the length of the program day. Regular classrooms were the least formal of all settings investigated. Children in individual programs who were also enrolled in regular classrooms thus received a great deal of informal programming and considerable opportunity for interaction with normal peers in a natural setting. Educators who advocate integration for hearing-impaired children do so precisely for this reason. Children with poor speech skills, however, might have more opportunity for "natural" interaction in T.C. classes, where the communication would be more easily understood. This argument leads to the hypothesis that different settings provide the greatest amount of natural interaction for different children.

The data support this point of view. They show that individual programming was most effective for the development of all areas of language in auditory and auditory/oral children. Group programming, however, was associated with better receptive language and better mother-communication among children in total communication programs. The issue, then, is not whether formal or informal instruction is better, but which program provides the best opportunity for a particular child.

Most workers in the area of language training currently advocate a combination of formal and informal techniques. This preference is seen in the most widely used texts in deaf education, for example, those by Daniel Ling (1976) and the Kretschmers (1978). For different children, however, different mixes of formal and informal experiences may be beneficial. Selection should depend on the areas of development in which the child is most deficient, as well as the child's ability to profit from particular experiences.

It was not possible to directly investigate the effectiveness of relatively formal and informal teaching techniques within programs for the hearing impaired. Observations, however, showed that all programs used a highly formal teaching style. The results of this study, plus what is known about the processes of language acquisition, suggest that teachers should attempt to provide more opportunities for informal interaction.

At the same time, there is a need to further develop and formalize some aspects of the curriculum. The study investigated programming and language assessment in the areas of

auditory training, speech, vocabulary, syntax, and reading. Interviews with teachers uncovered a lack of formal curriculum for the teaching of syntax and little formal assessment of children's progress in acquiring language skills.

At the risk of oversimplifying complex relationships, we can interpret the pattern of findings as indicating suggests the existence of two groups of deaf children: *natural learners* and *formal learners*. Natural learners are children with more hearing and higher IQs. Natural learners can begin formal instruction somewhat later than formal learners. They do well when placed in individualized programs in combination with regular class experience. Extensive formal parent training does not appear to be required.

Formal learners, on the other hand, are children with less hearing or lower than average intelligence. They require early programming, extensive instruction in specialized group settings, and formal parent training. Most of these children will require placement in total communication programs, where they can communicate fluently and easily with teachers and peers. A few children with profound losses will progress well in auditory programs if their loss is not too great and if their level of intelligence is high. Extensive parental involvement, however, will be required in order to ensure success.

11.3.10. Parents recommendations

Comments and recommendations from parents coincided with several of the major conclusions emerging from the data. Many parents made recommendations related to communication mode. Most recommended the expansion of total communication programs, but an important subgroup recommended auditory programs. Their responses mirror the finding that a subgroup of children did well in auditory programs, but total communication appeared to be better for the majority.

Communication mode, however, was not the overwhelming concern of parents: more comments related to increasing and improving services generally. Parents were especially concerned with the increased availability of programs in their local community, especially at the preschool level. At the same time, parents had concerns about the quality of local programs and reservations about wholesale integration.

11.3.11. Summary

This report has described a very complex study with numerous, sometimes contradictory findings. Although it is necessary to consider those findings in depth, it is also important to stand back from the "trees" and develop some view of the "forest" as a whole.

Considering the total import of the study, we might point to three general conclusions or themes that run through the myriad of specific findings. One is that the most important influences on development are child characteristics over which educators and parents have relatively little control: age, hearing loss, and intelligence.

The second general conclusion is that there are no single answers to the education of hearing-impaired children. Different approaches are differentially effective with different children. What is required is a move away from global statements about program superiority to a consideration of the needs of individual children.

Finally, the study has demonstrated the importance of attending to distinct aspects of development. In considering the growth of the hearing-impaired child, both linguistic and social development are important, and they may be influenced by different factors. Language itself is not a unitary ability but consists of a number of skills that may respond differently to educational variables. To some extent, program selection is a function of the values and goals that parents and educators seek to maximize for the children in their care.

Appendix A
SPEECH PRODUCTION AND RECEPTION MEASURE

The speech production and reception measure (SPR) was designed to assess the spoken language capabilities of preschool deaf children. The measure taps both receptive and expressive skills. The SPR thus complements the other measures used in the study, which assess language in the child's habitual mode of communication. This measure, however, is specifically concerned with language as expressed in speech.

A major problem encountered in designing the instrument was to adequately cover the range of abilities represented in the population. There are thus four subtests -- two for speech production and two for speech reception. The first speech production subtest includes items on which even the lowest functioning children are likely to succeed. The next two subtests tap more advanced skills in speech reception. A stopping rule between subtests 2 and 3 ensures that children are not tested on items that are too difficult. The fourth subtest, which is of speech production, was adapted from Ling (1976). It is open-ended and has a scoring system that encompasses the range of performance from the first appearance of vocal productions to mature behaviour.

Three of the four sections of the test represent adaptations of existing tests. A complete copy of the test is included at the end of this appendix, and should be referred to throughout the following discussion.

A.1. DEVELOPMENT OF THE INSTRUMENT

In the spring of 1981, a pilot version of the test was developed and administered to approximately 50 children who exited from the study that year. The results of that administration were analysed, and the test revised for use with the remainder of the sample. Thus, two versions of the test were used in the study. Only the final version is presented here.

Both versions of the test were constructed with the help of the teachers' subgroup of the advisory board.

A.2. FORMAT OF THE TEST

The SPR contains four sections, arranged in approximate order of difficulty (the terms in parentheses are the titles that appear on the test sheets):

- Production of words in isolation (A. Speech Production)
- Simple speech reception (B. Recognition Testing, Part 1)
- Complex speech reception (B. Recognition Testing, Part 2)
- Production of connected speech (Connected Speech)

A.3. GENERAL INSTRUCTIONS

As indicated on the testing form, each child's aid was checked prior to administration of the test, to ensure that it was in good working order. Testing did not proceed if it was not. The type of aid used and the acoustic conditions of the room were also noted.

The mode of communication used by the child in his or her classroom was used to give instructions in sections A and B. The sample of connected speech (section C) was elicited from all children using speech and gesture. Signs were avoided for this section in order to establish a set that would maximally encourage speech. Children, however, were allowed to sign or fingerspell if they wished. Pilot testing had established that signs were not required in order to convey the instructions.

A.4. PRODUCTION OF WORDS IN ISOLATION

The first section of the test assesses basic speech production abilities by showing childen pictures of familiar objects and asking them to name them. Following the *spontaneous* naming of each object, the tester names the object and the child *imitates* the label. This section of the test is tape recorded for later analysis.

The words used in the test include monosyllables, trochaics (two-syllable words with stress on the first syllable), and spondees (two-syllable words with equal stress on each syllable). Words were chosen according to the following criteria:

1. The word is familiar to young deaf children. Most of the monosyllables are words from the LAB test, and CID Auditory Tests W-1 and W-2 served as the source for many of the spondees.
2. Most of the monosyllabic words begin and end with a stop consonant. This requirement enables a clearer evaluation of the formation of the vowel (Ling, 1976).
3. The items are nouns that can be represented unambiguously by simple pictures.

4. The list, although not phonetically balanced, represents the range of sounds found in English.

The pilot version of the test had 8 words in each of the three word groups. The final version had the 13 monosyllables, 12 trochaics, and 11 spondees that appear on the test form. The new words that were added include fricative and nasal sounds that were infrequently represented on the original list. As these new words were not administered to all of the children, however, they were not included in the present analysis.

Both the spontaneous and imitated productions of each child were scored as follows:

- "-" No attempt, unintelligible attempt, or incorrect label
- "I" Intelligible attempt: sufficient phonemes present so that the word is recognizable
- "P" Perfect attempt: all phonemes present.

Scoring was done by a research officer with training in linguistics and speech pathology. A subset of the data was coded by a student in speech pathology in order to establish the reliability of the scoring categories.

Four overall scores were derived from the individual item scores. They are as follows:

1. Number of imitated words that were perfect or intelligible;
2. Number of perfect imitated words;
3. Number of spontaneous words that were perfect or intelligible;
4. Number of perfect spontaneous words.

A.5. SIMPLE SPEECH RECEPTION

Part 1 of section B tests the child's ability to comprehend spoken phrases using the 12 items from the short form of the Assessment of Children's Language Comprehension test by Foster, Gidden, and Stark (1977). The items in this test are of varying difficulty, including either two, three, or four critical elements. The phrases used represent the basic semantic relations that appear early in children's speech. Little syntactic knowledge is required; the test focuses on the child's ability to comprehend and remember words presented auditorially.

Items are presented with the mouth area covered so that the child has to rely on auditory cues alone. Each item is accompanied by a plate of four pictures. Following presentation of the stimulus, the child points to the picture that best represents the phrase.

A child's score on this section is the number of items correct.

A.6. COMPLEX SPEECH RECEPTION

Items for part 2 of section B were derived from the Clinical Evaluation of Language Functioning (CELF), a test developed by Elizabeth Wiig and Eleanor Semel (1980) to identify and diagnose the language problems of learning disabled children. The CELF consists of 12 subtests and 2 supplementary tests. Subtest 1 uses a format similar to the ACLC; that is, the tester speaks a sentence and the child demonstrates comprehension by selecting one of four pictures. In the case of the CELF, the auditory stimulus is a complete sentence rather than a phrase.

Subtest 1 of the CELF consists of 25 items of increasing complexity; all are more difficult than those appearing on the ACLC. Since the intent was to continue the format and structure of the ACLC as much as possible, 10 items were selected that, although more difficult because of their length, had relatively simple vocabulary and syntax. The items selected appear on the form. They were administered only to children who scored 10 or more correct on simple speech reception.

This section was developed after one year's use of the pilot version of the test. It was therefore not administered to the entire sample and was not included in the present analysis.

A.7. CONNECTED SPEECH

A sample of spontaneous connected speech was obtained from each child using a series of picture story cards. Children with limited speech and/or language skills could respond by simply labelling objects in the pictures, while children with higher level skills could describe actions or tell a story. Four pictures were shown to each child. Children were asked to "tell me a story". Specific questions about the pictures were used only with children who required more prompting.

This section of the test was tape recorded and later analysed using a modification of Ling's Phonological Level Speech Evaluation (1976). The following scores were derived from the qualitative information obtained in the evaluation:

1. Non-segmentals present: the number (0 to 8) of nonsegmental aspects of speech that were present;

2. Non-segmentals mastered: the number (0 to 8) of nonsegmental aspects of speech that were mastered;

3. Segmentals present: the number (0 to 131) of vowels, consonants, and blends that were present:

4. Segmentals mastered: the number (0 to 131) of vowels, consonants, and blends that were mastered;

5. Linguistic structure: the highest level structure present in the sample (1 = single words, 2 = two word phrases, 3 = noun and verb phrases, 4 = kernel sentences, 5 = compound sentences, 6 = complex sentences);

6. Intelligible utterances: the number of intelligible utterances;

7. Intelligible words: the number of intelligible words.

CHIRP
June 1982

ID: _____ Date: _____ Tester: _____

Speech Reception and Production

General Directions:

1. Check the acoustic conditions and note the following:

   Condition of aid: ___ Good ___ Not Good (DO NOT ADMINISTER TEST)

   Aid used: ___ Personal Aid ___ R/F w/o mike ___ R/F w mike

   Acoustic conditions: ___ Noisy ___ Fair ___ Good (no distractors)

2. Sections A and B are administered using the child's classroom communication mode for instructions. Section C (Connected Speech) is administered giving instructions in speech and gesture.

3. Tell the child that you are interested in their best speech. Remind them of this as required throughout the test.

A. Speech Production (words): "I'm going to show you pictures. You tell me what each one is. Then I'll say the word, and you say it after me. So, first you say the word, then I'll say it, then you say it again. OK? What's this?"

Item	Spontaneous	Imitated	Item	Spontaneous	Imitated
bed	___	___	cup	___	___
dog	___	___	boy	___	___
cake	___	___	nose	___	___
book	___	___	shoe	___	___
box	___	___	five	___	___
coat	___	___	mouse	___	___
hand	___	___			
		.....			
daddy	___	___	chicken	___	___
baby	___	___	turtle	___	___
table	___	___	wagon	___	___
cookie	___	___	toilet	___	___
window	___	___	finger	___	___
paper	___	___	bathtub	___	___

airplane	____	____	T.V.	____	____
baseball	____	____	birthday	____	____
toothpaste	____	____	snowman	____	____
hotdog	____	____	ice-cream	____	____
popcorn	____	____	ice-cube	____	____
cowboy	____	____			

B. Recognition Testing. "I'm going to show you some pictures." Focus the child's attention on each one. "Now I'll name one picture and you show it to me. I'll say it two times. Then you show me. Remember, I'll say it two times." Administer the item with the mouth area covered, but maintaining eye contact with the child. Use the carrier phrase "Show me the ..."

Part 1. (a) Training (/ or X): fish ____ jumping ____ dirty ____

(b) Testing (/or X):

1.	horse standing (11)	____	7.	boy riding the horse (27)	____
2.	broken cup (15)	____	8.	chicken in the basket (29)	____
3.	car and balloon (16)	____	9.	monkey sitting on fence (34)	____
4.	little tree (18)	____	10.	boy pulling the wagon + car (36)	____
5.	happy lady sleeping (22)	____	11.	clown eating the big apple (37)	____
6.	bird + dog eating (24)	____	12.	broken boat on the table (40)	____

Part 2. PROCEED TO PART 2 ONLY IF CHILD HAS 10 OR MORE CORRECT ON PART 1. (/ or X)

3.	The boy who is sitting under the big tree is eating a banana. (C)	____
7.	The boy is sitting at the piano. (C)	____
8.	The baby is between the mother and the father. (B)	____
11.	The girl has a big, spotted, black and white dog. (A)	____
12.	The woman showed the girl the baby. (D)	____
13.	The man who is wearing the raincoat is walking out the door. (A)	____
14.	The boy asked: "Where did you hide the present?" (C)	____
15.	The girl is walking home from the store. (B)	____
17.	Mother asked: "Who is that?" (A)	____
21.	The dog that is wearing a collar is eating a big bone. (B)	____

C. Connected Speech. USE SPEECH + GESTURE. "I'm going to show you a picture. Look at it. Think....Then tell me a story. What happened before? What is happening now? What will happen?

a. General Prompts. "What happened?" "What will happen next?" "Why?" "Anything else?"

b. Specific Prompts. "Who is this?" "What is (s)he doing?" "Where is (s)he going?"

Appendix B
RECEPTIVE LANGUAGE ASSESSMENT

B.1. Development of the Language Assessment Battery [LAB]

The Language Assessment Battery (LAB) was originally developed between 1975 and 1978 to assess the level of receptive language proficiency school-aged hearing-impaired children. In designing the original version, we sought to generate a sequence of items that mapped into the general patterns of language development so far as they were known in both normally hearing and hearing-impaired children. The work of Roger Brown (1973), Bowerman (1975), and others, including the Kretschmers (Kretschmer and Kretschmer, 1973) and Quigley and his associates (1974), was used to develop an overview of the sequence of expressive language acquisition for both groups. This overview served as the conceptual basis for the new receptive test.

Brown's (1973) work was particularily valuable. Brown had argued that children acquire the English language in five general stages of difficulty or complexity. He defined each stage on the basis of both a conceptual analysis of the language system and empirical data on the order in which various linguistic constructions appear during expressive development. Each of five broad stages contains linguistic constructions which are of varying difficulty.

Our task was to generate propositions that reflected the range of constructions and the various levels of difficulty. The propositions also had to satisfy other criteria. First, each had to be composed of the selected and pretested vocabulary that described a doll family and furniture in a doll house setting. Second, because this was a receptive language test, each proposition had to be demonstrable by the child. That is, it had to be possible for a child to act out the meaning of the proposition by manipulating the doll house toys.

In the first year, a total of 177 such propositions were devised -- with 30 to 50 items for each of the five stages. These propositions were administered to 145 severely or profoundly hearing-impaired children between the ages of 6 and 16. Administration was conducted in each child's primary mode of communication, which was defined as the mode in which he or she was being taught. The modes used were *auditory/oral* (residual hearing and speechreading), *Visible English* (fingerspelling plus speech), and *simultaneous method* (signs, and fingerspelling plus speech).

Because the primary purpose of the test was to determine the extent to which students understood the various syntactic structures encoded in the propositions, they were first tested on the vocabulary items that were to be used. If they had difficulty with any items, they were first trained on those items until they responded correctly. If there was any difficulty in training a particular student, that student was excluded from the calibration study.

Once the vocabulary was tested, the propositions were presented, commencing with the least difficult and proceeding to the most complex. Each proposition was presented twice, after which the child was given a chance to demonstrate his or her comprehension by manipulating the toys in the doll house. This procedure continued until all items were presented, or until a child clearly failed to respond correctly on five consecutive items.

Children's responses were scored as reflecting "high", "moderate", or "no" comprehension of each item. Analysis of the results permitted us to remove items with low estimates of reliability (i.e., low point-biserial correlations). On the basis of the proportion of children responding with "high" comprehension, we then reorganized the remaining items into a sequence of increasing difficulty. New items were added, so that there were at least four examples of each proposition type.

The resulting LAB battery (LAB II) consisted of 36 units of four or more propositions per unit The difficulty level of each unit ranged from 92.4 per cent correct responses to 17.8 per cent correct. The 36 units (table B.1) differed considerably from the five Brown substages -- a factor we attributed to both the receptive language response format of the task and differences in the language development of hearing-impaired children.

The second version of LAB was subsequently readministered to 119 hearing-impaired children between the ages of 6 and 13. Similar procedures were used, but this time items were presented in the new ascending order of difficulty that was developed from the earlier data.

Responses were again analysed to estimate the reliability and validity of this version of LAB. Reliability was assessed by computing point-biserial correlations between individual items and total scores for the 94 children who completed the entire test. Overall reliability was high, although items towards the end of the test were weaker.

The validity of LAB depends upon its character as a unidimensional measure that represents a linear scale of increasing difficulty. To assess these characteristics, factor analyses and Rasch scaling were conducted. The first 84 items of the proposition test were segmented into five overlapping groups, each containing 16 to 28 items. The responses of all children who completed a group but did not obtain a zero or a perfect score were included. The data analysis consisted of the tetrachoric correlations among items in each group. The factor analyses (both the orthogonal and equamax rotation solutions) indicated that about 60 per cent of the variance was accounted for by a single factor in all groups. Two-, three-, and

Table B.1

The 36 Proposition Units of the LAB Battery

Proposition Unit	Item	Language Unit
1	The dog is walking.	Agent/Action
2	A chair falls.	Patient/Action
3	Look at the book.	(Imperative) Action/Patient
4	Mother is walking fast.	Agent/Action/Manner
5	The baby has a spoon.	Beneficiary/Patient
6	Who is eating a cookie? (Father)	"Wh" Interrogatives
7	The boy throws the cookie.	Agent/Action/Patient
8	The girl and the dog went for a walk.	Co-ordinated Subjects
9	The children are eating.	Plural-Irregular
10	Throw the red book.	(Imperative)Action/Modifier/Patient
11	Mother gives the baby a cookie.	Agent/Action/Beneficiary/Patient
12	The knife falls off the table.	Location (or Patient/Action/Location)
13	Is Father sleeping? (no)	Interrogatives - "Is" (and "Do")
14	The girl took off her shoes and jumped on the bed.	Sequential Events(Event determines order)
15	The baby took the book.	Irregular Past
16	The baby pulls the dog's foot.	Possessive
17	The boy cuts the bread fast.	Agent/Action/Patient/Manner
18	The boy runs to get the milk.	Complementation
19	The baby eats what the boy gives her.	Embedded "Wh" Clauses
20	The man is making a box.	Agent/Action/Complement
21	The baby is playing under the table and the dog is sleeping on the chair.	Simple Co-ordination
22	Make the man stand up and walk.	Co-ordinated Predicates
23	The bread was cut by the mother.	Passives - Non-Reversible
24	Mother kicked the dog, then the dog bit her.	Sequencing Events - Word order = Event order
25	The baby hits the dog with the book.	Agent/Action/Patient/Instrument
26	Mother didn't see the baby fall because she was sleeping.	Causal Constructions
27	The child who has a hat takes a cookie.	Relative Adjectival Clauses
28	Which cookie is not on the plate?	Negative Interrogative
29	Father eats cookies.	Regular Plurals
30	The plate is not on the table.	Negatives
31	The ball is thrown to the dog by the boy.	Passive with Beneficiary - Reversible
32	Make the man or the girl stand up.	Disjunction
33	The girl is hit by the boy.	Passive - Reversible
34	The girl washed the cup after drinking some milk.	Sequencing Events - Event order Reversible
35	If the girl is wearing her coat, take it off. If not, put it on.	Conditional
36	Everybody has a cookie except the baby.	Contrastives

four-factor solutions only marginally increased the variance accounted for, implying that LAB II does indeed measure a single unidimensional variable, which might safely be interpreted as a unitary receptive language competence trait.

Rasch scaling analysis on these data further indicated that they had a moderate fit to the unidimensional latent trait model assumed in the scaling procedure. Several characteristics of these results require examination. Evidently the ability of the LAB II test to reflect a unitary latent trait increases towards the middle and later units of the test -- that is, from items 24 on. Given the relatively small *n* of this analysis, however, the results are promising. The poor fit of the Rasch model in earlier units may indicate that a second variable, such as item discrimination, is affecting the latent trait variable. This would suggest the need for further analysis to examine the goodness of fit of a two-variable model. Further analysis, however, must await a data set with a larger number of cases.

Generally the LAB proposition units meet the criterion of a unidimensional scale of increasing difficulty. It is this version of LAB that was adapted for administration to preschool children in order to study their receptive language skills.

B.2. THE PRESCHOOL VERSION OF LAB

From the results of the item analyses, we identified the proposition item in each of the 36 units of the LAB test that had the strongest item reliability (based on point-biserial correlation) and that best represented the midrange of difficulty of the unit. These items were formed into the screening test. This shortened version of the battery could be used as a preliminary screen with older children to determine which proposition units required further in-depth analysis. This short version was also used as the main test for the preschool version of LAB, although several modifications were required to adapt it for use with younger children.

Preschool LAB (table B.2) differs from the LAB screening test in both the details of its administration and its increased emphasis on content appropriate to the very beginning stages of language development. In order to accommodate the relatively short attention spans of younger children, the bl36 propositions from the screening test were divided into three groups of 12. Each group of 12 propositions was preceded by a check of the vocabulary contained in that particular set, after which the propositions were presented in a predetermined order.

The only content additions to preschool LAB were five *half-role* items, each of which consists of a noun and a verb. The sequence of these items was such that only one semantic role changed from one proposition to the next: for example, "Daddy sleeps." "Baby sleeps." "Baby eats." These half-role items were administered immediately after the first vocabulary check. Their purpose was to introduce the child to the task of manipulating the doll house items. They also served to assess mastery of language structures intermediate in difficulty between individual vocabulary items and full propositions.

Table B.2

A. Results on Preschool LAB - Round 1

	Correct n	Correct %	Incorrect n	Incorrect %	Stopped n	Stopped %	Point Bi-serial Correl.	Total Mean of Correct	Total Mean of Incorrect
Baby sleeps. (give baby to child)	89	57.1	11	7.1	56	35.9	.59	8.80	1.09
Dog sleeps.	70	44.9	30	19.2	56	35.9	.67	10.51	1.97
Dog runs.	64	41.0	36	23.1	56	35.9	.71	9.77	0.31
Boy runs.	45	28.8	55	35.3	56	35.9	.73	11.69	2.00
Boy falls.	49	31.4	49	31.4	58	37.2	.76	11.51	1.47
1. The dog is walking.	54	34.6	11	7.1	91	58.3	.75	10.91	3.91
2. A chair falls.	34	21.8	31	19.9	91	58.3	.69	12.82	6.32
3. Look at the book.	26	16.7	39	25.0	91	58.3	.53	11.92	8.26
4. Mother is walking fast.	20	12.8	44	28.2	92	59.0	.60	14.40	7.77
5. The baby has a spoon.	24	15.4	40	25.6	92	59.0	.64	14.13	7.27
6. Who is eating a cookie? (Father)	15	9.6	48	30.8	93	59.6	.60	16.40	7.98
7. The boy throws the cookie.	27	17.3	37	23.7	92	59.0	.74	14.81	6.22
8. The girl and the dog went for a walk.	32	20.5	32	20.5	92	59.0	.73	13.59	6.09
9. The children are eating.	5	3.2	57	36.5	94	60.3	.58	25.20	8.81
10. Throw the red book.	16	10.3	48	30.8	92	59.0	.53	14.56	8.27
11. Mother gives the baby a cookie.	25	16.0	36	23.1	95	60.9	.70	14.72	7.03
12. The knife falls off the table.	28	17.9	33	21.2	95	60.9	.73	14.50	6.52
13. Is Father sleeping? (no)	4	2.6	36	23.1	116	74.4	.44	22.25	11.81
14. The girl took off her shoes and jumped on the bed.	14	9.0	26	16.7	116	74.4	.69	18.64	9.73
15. The baby took the book.	23	14.7	17	10.9	116	74.4	.65	14.48	10.65
16. The baby pulls the dog's foot.	13	8.3	25	16.0	118	75.6	.74	20.31	9.28
17. The boy cuts the bread fast.	5	3.2	33	21.2	118	75.6	.36	17.40	12.39
18. The boy runs to get the milk.	18	11.5	20	12.8	118	75.6	.73	17.44	9.10
19. The baby eats what the boy gives her.	12	7.7	25	16.0	119	76.3	.68	19.83	10.20
20. The man is making a box.	9	5.8	27	17.3	120	76.9	.64	21.22	10.85
21. The baby is playing under the table and the dog is sleeping on the chair.	8	5.1	28	17.9	120	76.9	.70	24.00	10.43
22. Make the man stand up and walk.	12	7.7	24	15.4	120	76.9	.62	18.33	11.00
23. The bread was cut by the mother.	8	5.1	28	17.9	120	76.9	.59	21.00	11.29
24. Mother kicked the dog, then the dog bit her.	6	3.8	30	19.2	120	76.9	.64	25.33	11.07
25. The baby hits the dog with the book.	5	3.2	5	3.2	146	93.6	.62	26.60	18.60
26. Mother didn't see the baby fall because she was sleeping.	3	1.9	7	4.5	146	93.6	.48	27.00	20.71
27. The child who has a hat takes a cookie.	3	1.9	7	4.5	146	93.6	.48	27.00	20.71
28. Which cookie is not on the plate?	3	1.9	7	4.5	146	93.6	.56	28.67	20.00
29. Father eats cookies.	2	1.3	8	5.1	146	93.6	.48	32.00	20.25
30. The plate is not on the table.	6	3.8	4	2.6	146	93.6	.67	26.33	17.00
31. The ball is thrown to the dog by the baby.	5	3.2	5	3.2	146	93.6	.50	22.20	23.00
32. Make the man or the girl stand up.	3	1.9	7	4.5	146	93.6	.52	28.67	20.00
33. The girl is hit by the boy.	2	1.3	8	5.1	146	93.6	.48	32.00	20.25
34. The girl washed the cup after drinking some milk.	2	1.3	8	5.1	146	93.6	.46	31.00	20.50
35. If the girl is wearing her coat, take it off. If not, put it on.	4	2.6	6	3.8	146	93.6	.52	25.50	20.67
36. Everybody has a cookie except the baby.	2	1.3	8	5.1	146	93.6	.56	31.00	20.50

B. Results on Preschool LAB - Round 2

	Correct		Incorrect		Stopped		Point Bi-serial	Total Mean of	Test Children In-
	n	%	n	%	n	%	Correl.	Correct	correct
Baby sleeps. (give baby to child)	112	71.8	14	9.0	23	14.7	.48	12.94	0.71
Dog sleeps.	93	59.6	34	21.8	26	16.7	.65	15.27	1.91
Dog runs.	94	60.3	38	15.4	24	15.4	.65	13.56	1.76
Boy runs.	87	55.8	43	27.6	26	16.7	.68	14.33	2.21
Boy falls.	87	55.8	43	27.6	26	16.7	.68	14.30	2.28
1. The dog is walking.	87	55.8	10	6.4	59	37.8	.72	14.62	6.20
2. A chair falls.	62	39.7	35	22.4	59	37.8	.76	17.48	7.14
3. Look at the book.	45	28.8	52	33.3	59	37.8	.61	17.60	10.42
4. Mother is walking fast.	54	34.6	43	27.6	59	37.8	.75	18.30	8.05
5. The baby has a spoon.	52	33.3	45	28.8	60	37.8	.66	17.46	9.47
6. Who is eating a cookie? (Father)	31	19.9	65	41.7	60	38.5	.65	20.94	10.51
7. The boy throws the cookie.	59	37.8	37	23.7	60	38.5	.73	17.42	8.22
8. The girl and the dog went for a walk.	54	34.6	40	25.6	62	39.7	.70	17.65	9.33
9. The children are eating.	17	10.9	77	49.4	62	39.7	.52	22.53	12.25
10. Throw the red book.	29	18.6	65	41.7	62	39.7	.65	21.43	10.83
11. Mother gives the baby a cookie.	47	30.1	47	30.1	62	39.7	.65	17.89	10.32
12. The knife falls off the table.	47	30.1	47	30.1	62	39.7	.75	19.36	8.85
13. Is Father sleeping? (no)	20	12.8	57	36.5	79	50.6	.64	24.35	13.26
14. The girl took off her shoes and jumped on the bed.	45	28.8	32	20.5	79	50.6	.77	20.00	10.72
15. The baby took the book.	54	34.6	23	14.7	79	50.6	.74	18.17	11.39
16. The baby pulls the dog's foot.	30	19.2	47	30.1	79	50.6	.72	22.57	12.04
17. The boy cuts the bread fast.	20	12.8	56	35.7	80	51.3	.63	24.00	13.41
18. The boy runs to get the milk.	32	20.5	42	26.9	82	52.6	.67	21.09	12.90
19. The baby eats what the boy gives her.	19	12.2	55	35.3	82	52.6	.49	20.95	14.89
20. The man is making a box.	27	17.3	47	30.1	82	52.6	.71	23.22	12.55
21. The baby is playing under the table and the dog is sleeping on the chair.	16	10.3	58	37.2	82	52.6	.63	26.31	13.72
22. Make the man stand up and walk.	37	23.7	36	23.1	83	53.2	.71	20.39	12.39
23. The bread was cut by the mother.	28	17.9	45	28.8	83	53.2	.61	20.89	13.84
24. Mother kicked the dog, then the dog bit her.	21	13.5	52	33.3	83	53.2	.72	25.71	12.85
25. The baby hits the dog with the book.	14	9.0	23	14.7	119	76.3	.57	25.71	19.61
26. Mother didn't see the baby fall because she was sleeping.	8	5.1	29	18.6	119	76.3	.47	27.75	20.31
27. The child who has a hat takes a cookie.	9	5.8	28	17.9	119	76.3	.51	28.22	19.89
28. Which cookie is not on the plate?	14	9.0	20	12.8	122	78.2	.58	26.07	20.15
29. Father eats cookies.	8	5.1	26	16.7	122	78.2	.42	25.75	21.62
30. The plate is not on the table.	22	14.1	12	7.7	122	78.2	.65	23.82	20.33
31. The ball is thrown to the dog by the baby.	12	7.7	22	14.1	122	78.2	.50	25.08	21.23
32. Make the man or the girl stand up.	13	8.3	21	13.5	122	78.2	.61	27.54	19.52
33. The girl is hit by the boy.	8	5.1	26	16.7	122	78.2	.47	27.50	21.08
34. The girl washed the cup after drinking some milk.	10	6.4	24	15.4	122	78.2	.55	28.40	20.17
35. If the girl is wearing her coat, take it off. If not, put it on.	19	12.2	25	9.6	122	78.2	.61	24.00	20.80
36. Everybody has a cookie except the baby.	4	2.6	30	19.2	122	78.2	.44	34.25	21.04

C. Results on Preschool LAB - Round 3

	Correct n	Correct %	Incorrect n	Incorrect %	Stopped n	Stopped %	Point Bi-serial Correl.	Total Mean of Correct	Test Children In-correct
Baby sleeps. (give baby to child)	130	83.3	5	3.2	10	6.5	.33	18.83	2.09
Dog sleeps.	123	78.8	17	10.9	13	8.3	.50	19.76	6.52
Dog runs.	133	85.3	11	7.1	10	6.4	.51	19.75	2.00
Boy runs.	123	78.8	23	14.7	10	6.4	.57	21.02	6.47
Boy falls.	124	79.5	20	12.8	12	7.7	.64	20.06	4.55
1. The dog is walking	129	82.7	6	3.8	21	13.5	.58	19.44	11.33
2. A chair falls.	107	68.6	28	17.9	21	13.5	.68	21.53	9.71
3. Look at the book.	67	42.9	68	43.6	21	13.5	.48	22.60	15.62
4. Mother is walking fast.	105	67.3	30	19.2	21	13.5	.69	21.72	9.83
5. The baby has a spoon.	83	53.2	52	33.3	21	13.5	.65	23.19	12.52
6. Who is eating a cookie? (Father)	74	47.4	61	39.1	21	13.5	.65	23.96	13.16
7. The boy throws the cookie.	98	62.8	37	23.7	21	13.5	.66	22.07	11.16
8. The girl and the dog went for a walk.	96	61.5	39	25.0	21	13.5	.68	22.35	11.03
9. The children are eating.	31	69.9	104	66.7	21	13.5	.51	27.55	16.56
10. Throw the red book.	62	39.7	73	46.8	21	13.5	.45	22.55	16.14
11. Mother gives the baby a cookie.	79	50.6	56	35.9	21	13.5	.61	23.10	13.41
12. The knife falls off the table.	85	54.5	42	31.4	22	14.1	.71	23.62	11.53
13. Is Father sleeping? (no)	40	25.6	85	54.5	31	19.9	.61	27.75	16.86
14. The girl took off her shoes and jumped on the bed.	70	34.9	55	35.3	31	19.9	.70	24.96	14.47
15. The baby took the book.	80	51.3	45	28.8	31	19.9	.65	23.45	14.82
16. The baby pulls the dog's foot.	72	46.2	52	33.3	32	20.5	.71	24.86	14.35
17. The boy cuts the bread fast.	68	43.6	55	35.3	33	21.2	.73	25.56	14.38
18. The boy runs to get the milk.	66	42.3	57	36.5	33	21.2	.68	25.18	15.21
19. The baby eats what the boy gives her.	48	30.8	75	48.1	33	21.2	.62	26.63	16.68
20. The man is making a box.	70	44.9	53	34.0	33	21.2	.74	25.40	14.17
21. The baby is playing under the table and the dog is sleeping on the chair.	50	32.1	73	46.8	33	21.2	.60	26.06	16.79
22. Make the man stand up and walk.	81	51.9	41	26.3	34	21.8	.69	23.74	14.56
23. The bread was cut by the mother.	72	56.2	50	32.1	34	21.8	.62	23.78	16.16
24. Mother kicked the dog, then the dog bit her.	44	28.2	77	49.4	35	22.4	.69	28.45	16.29
25. The baby hits the dog with the book.	49	31.4	36	23.1	71	45.5	.71	27.86	20.78
26. Mother didn't see the baby fall because she was sleeping.	25	16.0	60	38.5	71	45.5	.51	29.28	23.02
27. The child who has a hat takes a cookie.	31	19.9	54	34.6	71	45.5	.58	29.23	22.35
28. Which cookie is not on the plate?	40	25.6	43	27.6	73	56.8	.64	28.40	22.21
29. Father eats cookies.	33	21.2	50	32.1	73	46.8	.57	28.45	23.04
30. The plate is not on the table.	62	39.7	21	13.5	73	46.8	.67	25.48	24.33
31. The ball is thrown to the dog by the baby.	35	22.4	48	30.8	73	64.8	.54	27.40	23.58
32. Make the man or the girl stand up.	35	22.4	48	30.8	73	46.8	.53	27.20	23.73
33. The girl is hit by the boy.	20	12.8	63	40.4	73	46.8	.44	29.05	29.05
34. The girl washed the cup after drinking some milk.	18	11.8	65	41.7	73	46.8	.42	29.17	24.09
35. If the girl is wearing her coat, take it off. If not, put it on.	48	30.8	35	22.4	73	46.8	.62	26.56	23.31
36. Everybody has a cookie except the baby.	20	12.8	63	40.4	73	46.8	.45	29.40	23.86

B.3. ADMINISTRATION OF PRESCHOOL LAB

The preschool LAB was administered to the 153 children in the study between three and seven years of age in each child's primary mode of communication (auditory/oral, Visible English, simultaneous method). As in the administration of LAB II to older children, administration began with a vocabulary check. In addition to identifying nouns, the child demonstrated verb knowledge. The researcher tested verb knowledge by giving the child the same-sex doll and asking the child, for example, to "show me walk". Before beginning the verb test, the examiner usually demonstrated the task for the child. When children failed to respond correctly to any vocabulary item, they were immediately trained on that item, and it was tested again following the next five vocabulary items. Children who responded to at least five vocabulary items correctly were tested on the half-role items without further training.

As in the administration of LAB II, each proposition was given twice, and the child was required to demonstrate the meaning of the item by manipulating the doll house furniture and toys.

B.3.1. The Stopping Rule

The rule for stopping the test allowed us to terminate administration before a child became frustrated by the task. The rule was sufficiently conservative, however, to ensure that few, if any, items within the child's mastery were skipped. This is confirmed by the pattern of correct and incorrect responses in the data. The rule was as follows. If a child failed to respond correctly to three or more half-role items, testing stopped, and the first group of 12 propositions was not presented.

The second set of vocabulary items and propositions was given only if the child correctly demonstrated 2 of the first 12 propositions. New vocabulary items were always checked before the propositions in a set were tested. Testing was terminated whenever a child failed to show mastery of a minimum number of vocabulary items required for a particular part of the test.

If a child showed correct comprehension of at least 4 of the second set of 12 propositions, the third set of 12 propositions was administered. First, however, the third set of new vocabulary items was checked. A brief break was given prior to testing each set of propositions, or whenever the child appeared to need one.

B.3.2. Scoring the Preschool LAB

Responses to the vocabulary and the half-role items were recorded as either correct or incorrect. Four possible responses were used to score the proposition items. The first was "high" comprehension, indicating the child's correct portrayal of the proposition without errors. The second was "good" comprehension, usually meaning that the child demonstrated

the criterial element in the proposition but made minor word sustitutions such as "washes" for "watches".

A *criterial element* was the characteristic syntactic element of the sentence that defined it within its language unit. For example, in the unit that tests comprehension of the agent-action relationship -- for example, "The boy walks", the child must correctly demonstrate both the agent and the action performed by the agent. A lexical substitution in this example might be demonstration of "The man jumps".

The third type of response, scored as "moderate," was produced by children who demonstrated the criterial feature of the proposition correctly but made more than one lexical substitution or had the roles of the lexical items reversed. When the child pointed to, picked up, or designated one or more correct objects of the proposition but failed to act out the event, the response was recorded as "poor".

Based on the scoring system, a handbook consisting of a set of possible responses for each proposition was prepared by the LAB research team (Keeton et al., 1979). The manual was used to score the responses to the proposition items in order to ensure consistency and completeness of scoring. A composite score for the entire preschool LAB was calculated for each child, including those who terminated the test prematurely as a result of the stopping rule.

Appendix C
MOTHER-CHILD INTERACTION SEQUENCE

The mother-child interaction sequence is a series of tasks designed to assess the communication between mother and child. The procedures are relatively informal and were designed to elicit communication that was as natural as possible. The interaction is recorded on videotape and is used to assess the following aspects of communication.

- the mode of communication used by the mother and by the child;
- the ability of the mother and child to communicate specified information;
- the linguistic complexity of the child's expressive language.

The sequence consists of these seven tasks:

1. *Book Reading*. The mother and child are given a book to talk about or read;
2. *Command*. The mother is told to request that the child place the book in a designated location. This command varies in complexity according to the age of the child, as follows:
    - Ages 3-4 - "PUT THE BOOK ON THE (TABLE/CHAIR,etc.)." Tester chooses a convenient surface in sight of the pair;
    - Ages 5-6 -"GIVE THE BOOK TO (the tester)";
    - Age 7 -"PUT THE BOOK in (the tester's) (BAG/PURSE/BOX)";
3. *Expressive Vocabulary Check*. The mother and child are given a box of toys, varying in number according to the age of the child. The toys are the same ones used in the LAB test and are listed on the scoring form that appears at the end of this appendix. The child is asked to name each toy;
4. *Receptive Vocabulary Check*. As the mother names each toy, the child attempts to identify the toy and put it back in the box. Children who are five and six years old are additionally asked to sort the toys into a large and a small on the basis of size. Seven-year-old children are requested to sort the toys into small, medium, and large boxes;
5. *Free Play*. The mother and child are given approximately ten minutes to play with the toys in any way that they wish;

6. *Action Pictures.* The child is shown a card containing a number of simple pictures. In random order, the mother describes each picture, and the child indicates the picture described. There are three cards, each containing four pictures. This task is given only to children who have identified at least five toys in task 3b;

7. *Picture Sequence.* The mother is shown a cartoon strip and tells the story to the child without showing him or her the pictures. The child is then given the four pictures and asked to arrange them so as to reproduce the story. This task is administered only to six- and seven-year-old children who have correctly identified at least eight of the action pictures in task 5;

8. *Toy Selection.* The mother is given a bag of inexpensive toys and asked to allow the child to select one to keep.

The videotapes are scored to assess communication mode, communication ability, and linguistic complexity as described in the following sections. The complete scoring forms appear at the end of the appendix.

C.1. ASSESSMENT OF COMMUNICATION MODE

The videotape is observed to note which modes of communication are used by the mother and by the child on each task. The separate modalities noted include speech, manual English, Ameslan, fingerspelling, gesture, pointing, writing, cues, and drama. The observer also records the combinations in which these modes appear. Thus, *sign alone* is recorded as distinct from *sign plus speech*. See the scoring form for a complete listing of the possible combinations.

For each task, the observer notes which mode is used most often; this is called the *predominant* mode. In some cases, particularly with children, two or more modes may be used with equal frequency, in which case all will be listed as predominant. *Rare* modes are ones observed only once or twice. *Supplemental* modes occur more than once or twice, but not as frequently as predominant modes.

Following the scoring of the separate tasks, the observer makes an overall assessment of the predominant, supplemental, and rare mode(s) used. Specific rules for combining the results of the separate tasks are given on the scoring form.

C.2. ASSESSMENT OF RECEPTIVE COMMUNICATION ABILITY

There are five scores of communication ability, which are derived from tasks 2, 3b, 5, 6, and 7. Each of these tasks assesses the mother's ability to communicate with the child. This involves both the mother's ability to encode information in a form recognizable to the child and the child's ability to decode what the mother says. Thus, these measures must be viewed as an assessment of the mother and child together, rather than of the child alone, as there is no attempt to control the type of input the mother provides. The manner of scoring each task is described as follows.

1. *Command.* The child receives one point for a correct response to the command.

2. *Receptive Vocabulary.* The child receives one point for each toy correctly identified. The child also receives a score that represents performance in sorting the toys by size. This score reflects the extent to which the child demonstrated an understanding of the general concept of sorting as described by the mother, rather than his or her ability to sort per se.

3. *Action Pictures.* The child receives one point for each picture correctly identified.

4. *Picture Sequence.* The child receives one point for each adjacent pair that is in the correct order. Thus, a sequence that is totally correct -- that is, pictures are placed in the order 1-2-3-4 -- receives a score of 3. This represents three correct sequences: 1-2, 2-3, and 3-4. Placement of the pictures in the order of 1-3-2-4 would receive a score of 2, since only the 1-3 and 2-4 sequences are correct. The overall score for the two sequences ranges from 0 to 6.

5. *Toy Selection.* The child receives one point if he or she responds correctly to the mother's command.

A receptive total score is computed by summing the individual scores for tasks 3b, 5, and 6.

C.3. ASSESSMENT OF EXPRESSIVE COMMUNICATION ABILITY

The measure of expressive ability is derived from task 3a, expressive vocabulary. This score is simply the number of intelligible labels that the child produces. The scoring is irrespective of whether the labels are spoken or manual. The basic criterion in accepting a label is whether the child successfully communicates a concept. Thus, a home sign or a word used only within the family is accepted as long as the mother recognizes what is said. A child also scores correct if the tester understands what was said, even if the mother does not. There was also flexibility in the conventional labels that were accepted. For example, "drink" would be scored as a correct response to "cup". Any label, however, could be used only once. Thus, if "eat" was accepted as a response to "cake", it would not also be accepted for "apple", "cookie", or any other of the food items.

It was originally planned to derive other measures of expressive ability from the spontaneous language produced by the child during the book reading (1) and free play (4) periods. In deriving these scores, we planned to compile a transcript of all spoken and manual language produced by the child. The transcript would then be scored for mean length of utterance (MLU), using procedures adapted from Miller (1981). Separate scores could be derived for the child's spoken and manual language. Length would be assessed in terms of both words and morphemes. Thus, a signing child would receive four scores for length: MLU for speech in words, MLU for speech in morphemes, and two equivalent scores for signed and/or fingerspelled productions. The transcript could also be scored for the number of utterances, both spontaneous and imitated.

Time constraints made it impossible to complete these analyses for the present report. It is hoped that they can be completed in the future.

CHIRP
February 1979.

Date of Form_____

MOTHER-CHILD INTERACTION CODING

ID: _____ Data Yr.: B M E Date: Mo _____ Yr _____

	COMMUNICATION MODE		Mother			Child		
	Task		Predom	Supple	Rare	Predom	Supple	Rare
	1. Book	a						
		b						
	2. Command	a						
		b						
	3a. Express. Vocab.	a						
		b						
	b. Recep. Vocab.	a						
		b						
	4. Free Play	a						
		b						
(Opt.)	5. Action Pictures	a						
		b						
(Opt.)	6. Picture Seq.	a						
		b						
	7. Toy Selection	a						
		b						
	Overall	a						
		b						

Communication Modes

01.	T(inc. V)	05.	S + T + G	09.	W	77.	Not Applicable - criterion not reached.
02.	G	06.	F	10.	D		
03.	S	07.	F + T	11.	A	99.	Not Applicable, child not testable.
04.	S + T	08.	C	12.	G + T	-.	None - no communication in that category.
				13.	P + T		
				14.	P		
				15.	A + T		

Scoring Rules

1. Predominant - the mode or modes which is predominant most often
2. Supplemental - the mode or modes which appear as predominant or supplemental in one-third or more of the items coded.
3. Rare - any other mode or modes which appear in two or more of the items coded.

M-C Coding
p. 2

COMMUNICATION SCORES

2. Command
0. Incorrect (2 or 4)
1. Correct (1 or 3)
9. Not administered - child not testable ____

	3. Vocabulary	a. Expressive	b. Receptive
	Mother		
	Father		
(3-4 yrs)	baby		
	bed		
	fridge		
	apple		
	cake		
	milk		
	cup		
	car		
	table		
	chair		
	.....		
	same sex doll		
	dog		
(5-6 yrs)	TV		
	stove		
	.....		
	bread/toast		
	plate/dish		
	egg		
	fork		
	knife		
	pot/pan		
	.....		
(7 yrs)	opp. sex doll		
	sink		

Codes

0. Incorrect
1. Correct
6. Mother did not present item
7. Not administered - criterion not reached

a. Expressive score: number correct - 00 to 24, 99 ____

b. Receptive score: number correct - 00 to 24, 99 ____

c. Placement:
0. No - child does not understand the concept.
1. Partial - child correctly places > ½ of the items.
2. Yes - child incorrectly places no more than 4 of the items according to "big" and "small" designation.
3. Yes - child incorrectly places no more than 4 of the items according to "big", "medium", or "small"
6. Mother did not test.
7. Not administered - criterion not reached

d. Intelligibility: 00 to 24, 99 - No. of items intell. to M but not to E ____

M-C Coding
p. 3

5. Picture Choice: 00 to 12 - Number correct
77 - Not administered
99 - Not administered - child not testable. ____

(Criteria for Administration: 5 correct on Receptive Vocabulary)

6. Picture Sequence: 01 to 06 - Number of sequential pairs in correct order.
77 - Not administered - criterion not reached. ____
99 - Not administered, child not testable

(Criteria for Administration: child is 6 or 7 yrs of age and correctly identifies 8 action pictures)

7. Toy Selection 00 - Incorrect.
01 - Correct. ____
99 - Not administered - child not testable

MOTHER'S ENCODING COMPLETENESS - Form III only

Task	Little	Some	Most	All	NM	NA
1. Book	1	2	3	4	7	9
4. Free Play	1	2	3	4	7	9
6. Pict. Seq. - a.	1	2	3	4	7	9
b.	1	2	3	4	7	9
Overall - mode or ave.	1	2	3	4	7	9

Note: Do not score if there are less than two items coded.
"NM" means "not manual," i.e., the mother did not use signs or fingerspelling combined with speech.

MOTHER'S JUDGEMENT

	Typical	Not Typical	Not Administered	
a. behaviour	1	2	9	____
b. language	1	2	9	____

Appendix D
MATHEMATICS TEST

The test of mathematical ability assesses the child's understanding of numbers and number concepts from the most elementary knowledge through simple computations.

A new test was constructed because existing measures required a great deal of verbal ability. Each section includes training items that allow a simple demonstration of the task. All responses are written.

The test, which appears on the following pages, is composed of seven subsections. The score for each section is simply the number of items correct. Scores from the first five sections are summed to yield a basic-concepts score. Scores from the last two sections are summed for a computation score. A total math score is also computed.

The seven subsections are:

1. Copying numerals: copying the numerals from 1 to 10 (3 training and 10 test items). Any child who does not copy at least 8 correctly does not proceed with the rest of the test;

2. Writing numerals: writing the numerals from 1 to 20 (15 items);

3. Number sequences (10 items);

4. Rational counting (3 training and 5 test items);

5. One-to-one correspondence (3 training and 5 test items);

6. Computation 1: computation section in part 3 from the Metropolitan Achievement Test, Primer, Form F (4 training and 14 test items);

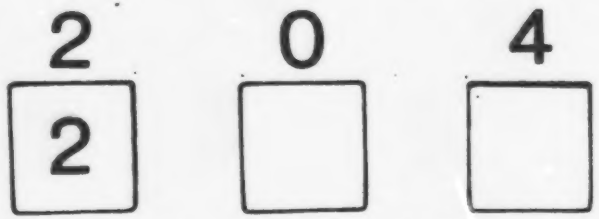
7. Computation 2: computation section in part 4 of the Metropolitan Achievement Test, Primary I, Form F (3 training and 22 test items).

CHIRP
May, 1981

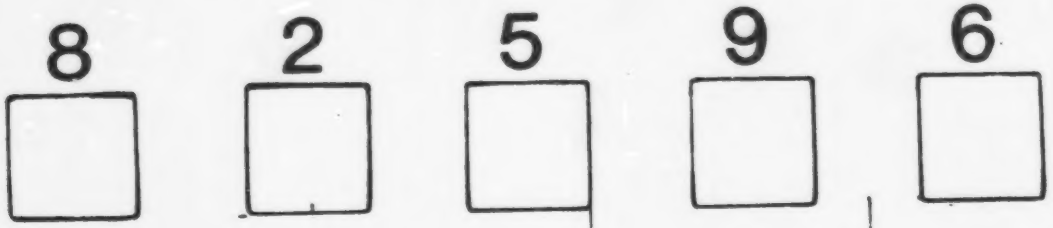
ID:
DATE:
TESTER:

187A

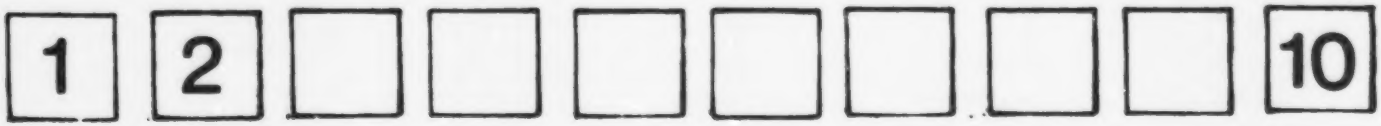
(Training)



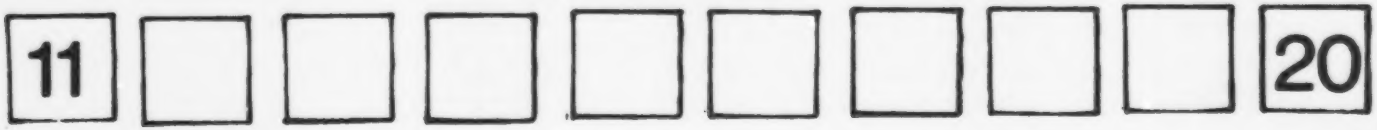
(Test)
1 - 10



WRITING NUMERALS
(11 - 25)



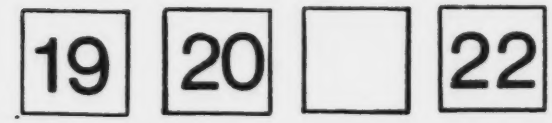
187C

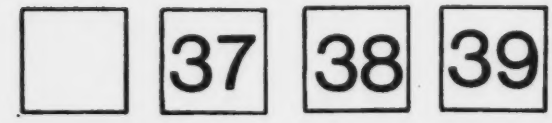


SEQUENCES
(26 - 30)

A

B

C 

D 

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SEQUENCES
(31 - 35)

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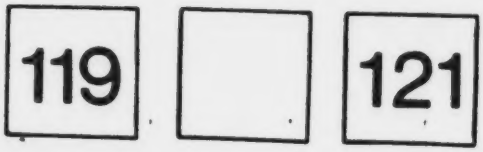
H 

J

K

COUNTING 5

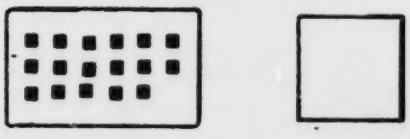
(Training)

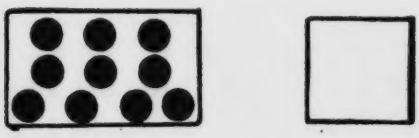
L

M

(Test)
(36 - 38)

P

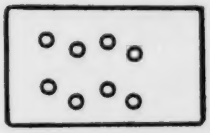
Q 

B 

COUNTING 6

(39 - 40)

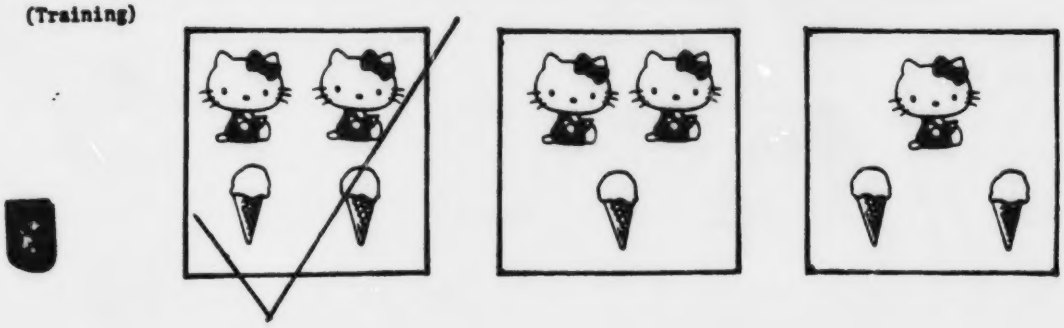
S

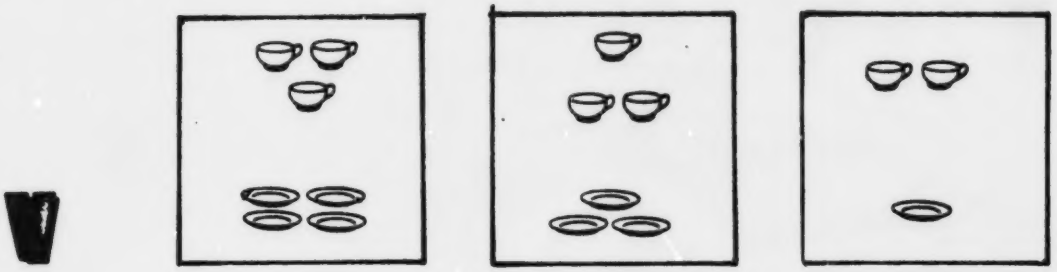


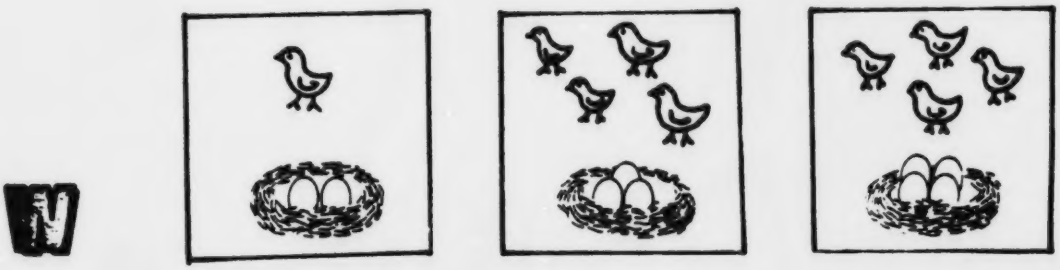
T

CORRESPONDANCE 7

(Training)

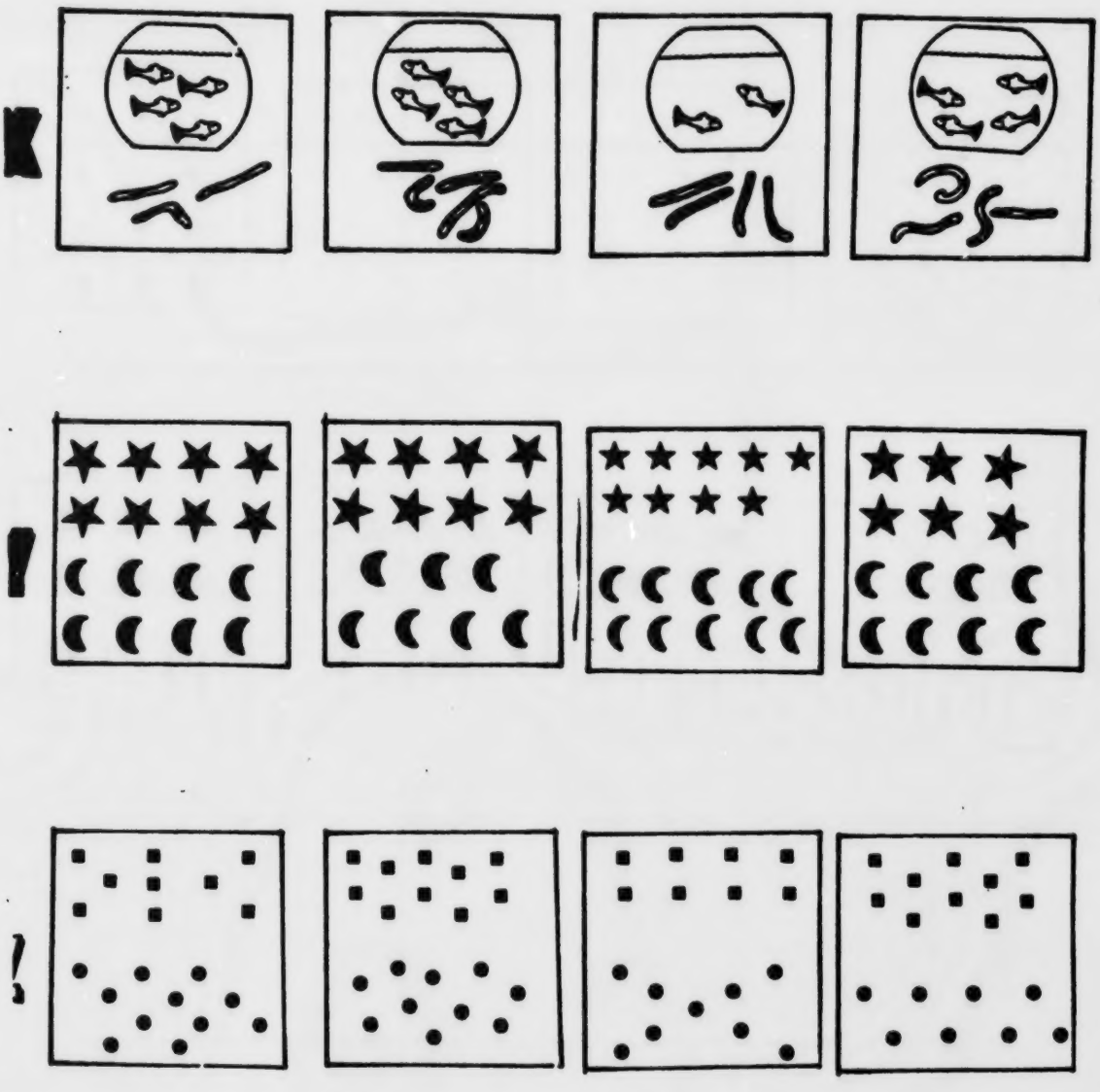






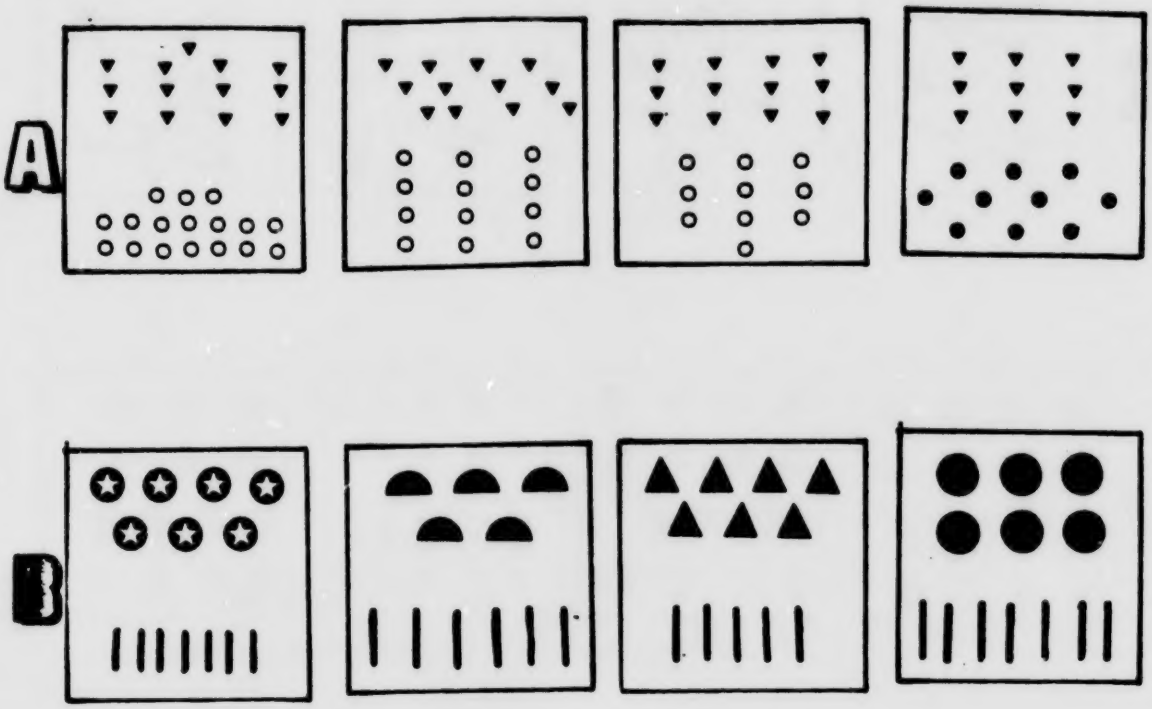
CORRESPONDANCE 8

(Test)
(41 - 43)



CORRESPONDANCE 9

(44 - 45)



PART 3: Numbers (continued)

SAMPLE A: $\begin{array}{r} 3 \\ +1 \\ \hline 4 \end{array}$?	**SAMPLE B:** $1+2=\boxed{3}$?	21 $\begin{array}{r} 2 \\ +4 \\ \hline \end{array}$?
22 $\begin{array}{r} 1 \\ +6 \\ \hline \end{array}$?	23 $\begin{array}{r} 5 \\ +5 \\ \hline \end{array}$?	24 $\begin{array}{r} 7 \\ +0 \\ \hline \end{array}$?
25 $\begin{array}{r} 5 \\ +2 \\ \hline \end{array}$?	26 $\begin{array}{r} 6 \\ 2 \\ +2 \\ \hline \end{array}$?	27 $\begin{array}{r} 6 \\ 0 \\ +1 \\ \hline \end{array}$?
28 $\begin{array}{r} 3 \\ 2 \\ +1 \\ \hline \end{array}$?	29 $2+2=\square$?	30 $5+4=\square$?
SAMPLE C: $\begin{array}{r} 3 \\ -1 \\ \hline \end{array}$?	**SAMPLE D:** $3-1=\square$?	31 $\begin{array}{r} 8 \\ -4 \\ \hline \end{array}$?
32 $\begin{array}{r} 5 \\ -3 \\ \hline \end{array}$?	33 $7-3=\square$?	34 $4-2=\square$?

Part 3 Score ____

TEST 4: Mathematics *Part A: Concepts (continued)* P1-F

6

0 1 inch 2 inches 3 inches 4 inches 5 inches

1 3 5 2 DK

7

DK

8

DK

9

DK

10

DK

11

DK

Go on to the next page

Appendix E
THE SOCIAL DEVELOPMENT SCALE

E.1. DEVELOPMENT OF THE SCALE

The social development scale was developed largely through the work of Dr. Rita Simon during her association with the project.

Social development normally includes the areas of self help, social relationships, independence, responsibility, and communication. Given the handicap of deafness, however, and the fact that language development was to be studied so intensively in its own right, it was decided that the social development scale should not assess communication ability, nor should individual items reflect linguistic skill. Another requirement was that the scale have sufficient items in the preschool period -- items that reflect normal development and cover areas that are particularly troublesome for deaf children.

In deciding on an appropriate instrument, we first searched the existing literature. The only instrument that seemed appropriate at that time (1978) was one published by Alpern and Boll (1972) entitled Developmental Profile. This instrument had been standardized on a large sample of American children in the age range that was of interest to the study (one to nine years). Children with various types of learning problems and other disabilities had been included in the standardization sample. Furthermore, Kathryn Meadow had been using the scale for several years with deaf children at the Kendall Demonstration Elementary School. We therefore felt the scale would be relevant to our population.

The Alpern and Boll scale is composed of five subscales: physical, self help, social, language and academic development. Only the first three subscales were useful for our purposes, since the abilities tested by the last two are heavily dependent on language and are tapped by other measures used in the study. The physical scale covers motor development in such areas as walking, climbing, games, and arts and crafts. Self help covers development of the self management skills that are involved in day-to-day activities, such as dressing, toileting, and eating. The social subscale monitors children's developing awareness of others as social beings and their interpersonal skill in relating to others.

Each subscale consists of 33 items arranged in 11 age steps between 1 and 9 years: 1-1 1/2; 1 1/2-2; 2-2 1/2; 2 1/2-3; 3-3 1/2; 4; 5; 6; 7; 8; 9.

Although the Alpern and Boll scales provided a good starting point, we felt that they did

not map out the various aspects of the child's development in sufficient detail. As a result, we reorganized the self help and social subscales into 12 new sub-areas associated with a child's emotional and social development and added items to make each subscale complete. The physical subscale was retained and administered as is.

Table E.1 contains a brief description of each of the areas that eventually became subscales in a new, expanded social development scale. The table also indicates the age range spanned by each subscale and the total number of items in that subscale. Five Alpern and Boll items had to be modified in order to make them suitable for deaf children. In general, the modifications involved making the items less dependent on language.

The 66 items from the Alpern and Boll self help and social subscales were distributed across 11 of the 12 areas into their appropriate slots. Table E.2 summarizes this distribution. Note that the 12th subscale -- *sleeping* -- is not included in this table as there were no Alpern and Boll items in the sleep category.

It can be readily seen from table E.2 that the number of Alpern and Boll items contributing to a subscale varied from one subscale to another, ranging from 0 to 3. Not all age slots were filled by Alpern and Boll items in any given subscale, and the age slots represented by Alpern and Boll items differed from scale to scale.

Starting with this base, we then expanded the social development scale by adding items to fill in the blanks in both age level and subscale. The primary source of these items was Gesell's description of the child's social and emotional development (Gesell, 1949). Although there are no formal empirical norms for these items, Gesell defines the criterial behaviours very explicitly and provides age ranges for each milestone discussed.

By and large, where an overlap existed between Alpern and Boll and Gesell, there was also general consistency in the order in which various milestones were reached. There were some differences in the absolute age at which a particular milestone was supposedly attained. In Gesell, for example, children are able to dress themselves completely before nine years of age, whereas for Alpern and Boll they are capable of this, including tying their shoelaces, by age seven. Whenever there were any discrepancies between the two sources, the Alpern and Boll age norms were used because they had more extensive empirical validation.

The new scale includes a total of 132 age-level-by-subscale slots. Our target was to try to generate at least one item for each of the 132 slots. To fill in the missing spaces, we supplemented the 66 items from Alpern and Boll with an additional 88 items derived from Gesell. In some cases, more than one item was required to cover a slot. The net result was a total of 154 items.

It was not always possible to generate items over the full age range, because developmental milestones do not occur throughout every age range on some subscales. Most of the milestones regarding toileting, for example, are passed by age 5. Other areas of

Table E.1

Subscales Contained in the Social Development Scale

Name of Subscale	No. of Items	Age Range(Yrs.)	Description of Subscale
1. Eating (E)	12	1-9	Primarily the development of skills in using eating utensils, but also development of preferences and eating formalities.
2. Toileting (T)	7	1-5	Covers various aspects of toilet training.
3. Dressing (D)	10	1-9	Learning to dress oneself.
4. Bathing (B)	9	1-9	Cleanliness, grooming, and personal hygiene.
5. Sleeping (SL)	11	1-9	Bedtime rituals; regulation of sleep; self-sufficiency regarding bedtime.
6. Play and Pastimes (PL)	13	1-9	How does the child use and structure playtime; what are the child's interests; what does the child like to do and how organized is he or she in doing it.
7. Personhood (PH)	20	1-9	The development of a sense of "self", a sense of individuality; knowing who one is and that one is; in later years, a growing self-awareness, including self-criticism.
8. Peer Relations (PR)	11	2-9	The development of social interaction patterns with one's peers from "parallel play" to "best friends" and "gangs". Wanting to be with peers and caring about them.
9. Personal Space (PS)	10	1-9	Independence in a spatial sense; the development of the ability to take distance (geographical) from home, mother; the gradual widening of territory in which the child feels secure and competent.
10. Comprehension (Com)	19	1-9	The development of several aspects of comprehension and awareness, including awareness of some basic categories associated with people and events, such as safe-unsafe, good-bad, and right-wrong. Awareness of simple social "rules" such as taking turns and the right of possession as well as evidence of the ability and desire to respect them. Items related to the child's emerging "common sense" and knowledge of what to do, what's important, what's relevant, what's meaningful in social contexts are also included in this subscale.
11. Responsibility (R)	11	3-9	Development of self-discipline, a sense of duty and/or responsibility.
12. Sequence (SE)	13	1-9	Behaviour reflecting awareness of spatial, temporal, and functional sequences and orientation in time.

Table E.2

Distribution of SH and S Alpern and Boll Items in the Various Subscales of the Social Development Scale

Age Range (Yrs)	Subscale										
	Eating	Toileting	Bath	Dressing	Play-Pastimes	Personhood	Peer Relations	Personal Space	Comprehension	Sequence	Responsibility
1-1½	SH8[1] SH9			SH7	S7[2] S9					S8	
1½-2	SH12			SH11		S16		S12	SH10 S11		
2-2½	SH15	S15	SH13		S14	S13			SH14		
2½-3				SH16 SH17 SH18					S16 S17 S18		
3-3½		SH19 SH20	SH2		S20			S19	S21		
4				SH22				S23	S24	SH24 S22	SH23
5	SH25					S25	S26		SH26 S27	SH27	
6	SH28		SH29				S28	S29	S30		SH30
7	SH33		SH32				SH36		S32 S33		S31
8				SH34	S34				S36		S35 SH35 SH36
9							S38	S37		SH38	SH37 SH39 S39

Note: "Sleeping" subscale not shown because there are no Alpern and Boll items in it.

[1]SH = Alpern and Boll self help subscale.
[2]S = Alpern and Boll social subscale.

Table E.3

Item Distribution Among Subscales of the Social Development Scale

Subscale Name	Age Range (Yrs.)	Number of Alpern and Boll Items	Number of Gesell Items	Total Number of Items
1. Eating	1-9	7	5	12
2. Toileting	1-5	3	4	7
3. Dressing	1-9	7	3	10
4. Bathing	1-9	4	5	9
5. Sleeping	1-9	0	11	11
6. Play and Pastimes	1-9	6	7	13
7. Personhood	1-9	3	17	20
8. Peer Relations	2-9	3	8	11
9. Personal Space	1-9	5	5	10
10. Comprehension	1-9	14	5	19
11. Responsibility	3-9	9	2	11
12. Sequence	1-9	5	13	18
		66	88	154

behaviour don't start developing until later. Significant milestones in the area of peer relations, for example, aren't achieved until around 2 1/2 to 3 years of age.

Four *information gathering* items were included. These items are of general interest in the social/emotional area but aren't associated with specific age milestones.

Finally, it should be noted that what was most important about the two reference sources used was not the age norms themselves, since we weren't primarily interested in whether or not the preschool deaf children in our study met the age norms of normally developing children. What was most useful about these two sources was their quite detailed specification of the types of behaviour to look for in the developing child and the general order in which they are likely to emerge. Monitoring behaviour as it emerged across 12 distinct subscales of development gave us the breadth of coverage needed to detect gaps or atypical patterns of development in the atypical population we were studying.

Table E.3 summarizes the 12 subscales and the disribution of Alpern and Boll and Gesell items among them.

E.2. ADMINISTRATION OF THE SCALE

In administering each subscale, the interviewer began by establishing a *basal age*. This is the age below which all items in the subscale were passed, or could be presumed to have been passed. The interviewer went as low in the scale as was necessary in order to establish a basal age and then continued to present items until all items for two consecutive age periods were failed. This established the child's *ceiling* on that subscale.

A considerable amount of training and continued consultation were required in order to ensure consistency of administration and scoring procedures among testers. As it stands, the scale is quite complicated to administer and should be considered a research instrument only.

E.2.1. Instructions for Administration

Following are the instructions used to administer and score the scale. A total score for the scale was obtained by adding the number of items passed or presumed to have been passed for those items below the basal age.

1. Read the following introductory comments to the parent.

   Now I am going to ask you about your little boy's (girl's) behaviour in several different kinds of situations and about his general 'personality'. I will be asking you questions based on what hearing children are like at different ages. We are interested in learning about how hearing-impaired or deaf children develop and how they handle these situations. We want to find out what is 'normal' for deaf children of different ages and with different

kinds of hearing loss and in different kinds of programs.

Some of these items pertain to much older children (e.g., some of them describe 6-, 7-, 8-, or 9-year-old children), so you should expect that your child will not yet show some of the behaviours described. (This point may have to be repeated throughout administration of the scale.)

2. Then proceed through all the subscales, introducing each as described below:

- *Eating* - These first questions are about your child's eating habits. (If already described in the interview, acknowledge this to parent, then proceed from appropriate starting level as described in next section.)
- *Toileting, bathing, dressing, sleeping* - Same as for eating except substitute appropriate term.
- *Play-pastimes* - These questions are about how your child spends his (her) time, about his (her) favourite activities.
- *Peer relations* - Does your child play with other children? What's it like? (Determine and proceed from appropriate age level.)
- *Personhood* - We've already discussed your child's "personality" to some extent. Here are a few more questions about that.
- *Personal space* - Have you been able to leave the child as yet? Has he been able to spend time away from you?
- *Comprehension* - The next questions have to do with learning and understanding rules and expectations: learning what is allowed and what isn't, what is right and wrong, real, not real, and so on. For example: (choose item at appropriate age level).
- *Responsibility* - These next questions have to do with developing a sense of responsibility.
- *Sequence* - These last few questions have to do with the child's sense of time, and of order.

E.2.2. Scoring

1. Basic scoring

Items are scored:	+	(yes)
	-	(no)
	-/N.O.	(no opportunity)

Score "+" only when it is a full "yes". A qualified "yes" when the test item does not specifically allow for qualification should be scored "-".

Make sure to record a score for every item asked. Do not record a score for any item that has not been asked. That is, do not record presumed "yes's" or "no's".

2. No opportunity

Parents' comments may suggest that a child has had "no opportunity" to learn or practice a skill. A "no opportunity" score should be given for all "no opportunity" situations. These include: equipment not available; behaviour is prohibited by parent; parent chooses not to teach because of child-rearing philosophy; geography or type of neighbourhood limits opportunity. This list is not exhaustive. Whenever a parent's response indicates that there is "no opportunity", record "-/N.O." and the relevant qualifying information.

3. Don't know

If the mother responds "Don't Know" to any item, inquire further, or, if possible, test the child directly. If it is still not possible to credit the child, score "-". If mother can give no examples of a behavior, "Don't Know" is most likely a "no". The following items most frequently elicit a "Don't Know" response: PH12, PH18, PS7, COM12, PL6, SEQ11, SEQ12, SEQ13, SEQ5, PR5, PR7.

4. Starting and stopping points

Basal Age. Correct administration requires accurate determination of basal and ceiling levels. The basal age is the point at and below which all items are, or may be assumed to be, "+".

Parents' comments either during the interview or when the interviewer introduces each section of the subscale will generally give the interviewer an idea of where to begin in the list of questions under a topic. Direct observation of the child may also help determine starting points. Generally speaking, the interviewer should begin with all items appearing in the age range one year younger than the child's chronological age. In the case of a child with suspected or diagnosed developmental delay, begin one year below the child's estimated developmental age.

If the child passes all items at C.A. (or developmental age) minus one year, continue administering the scale. If the child fails at this point, proceed backwards until all items have been passed in two age levels.

An exception to this rule occurs when the interviewer is certain that a specific milestone has been reached (e.g., toilets himself). When this is so, the interviewer need not ask questions preceding this achievement in order to make certain that the basal age has been reached (e.g. tells you when diaper is wet). Instead, check off as passed all items preceeding the milestone -- saying to parent whenever there is any doubt, "Does that mean that child has already learned (or no longer does) such and such?"

Ceiling Level. Once a basal age has been established, continue administering items until there are three consecutive minuses. This is the child's ceiling on that topic.

5. Follow-up administrations

Before each repeat administration of the scale, look over the recording sheet from the previous year and mark off on the new scoring sheet the previous year's basal and ceiling levels.

Start administering items at the previous year's basal level. This ensures follow-up of all responses that were not previously passed. If, on repeat administration, the basal level is no longer passed, go back further to determine a new basal age for the new year.

Once a starting point has been determined, administer items as in the first year until a new Ceiling has been determined, i.e,. three consecutive minuses.

6. Ordinality of items

Items appear in a developmental sequence, and it is assumed that the child can be credited with passing all behaviours that appear at earlier ages. Thus, if a child is credited with 3- or 4-year-old behaviours in a given area, it is assumed that he is capable of behaviour in that area typically achieved by children 1 or 2 years of age. This assumption seems valid, especially when referring to behaviours which, once they have emerged, continue in the child's repertoire even as more advanced behaviors are added.

Some items on the scale, however, refer to behaviours which are appropriate to one stage of development, but which later drop out when more advanced behaviours appear.

An obvious example would be: *indicates wet pants and puddles to mother.* This is a sign of development in toilet training when a child is 1 to 1.5 years old, which later drops out when the child is toileting himself. Items like this pose a problem in scoring. When asked about a behaviour which once was present but has since dropped out, a mother may answer in the negative. Should her answer be scored "+" or" -"? Clearly the child should receive credit for a behaviour that once was part of his repertoire but has since been outgrown.

Many items referring to these kinds of behaviour have been worded *Does, or did he ever ...* or *Has he ever...?* A few of the Alpern and Boll items are not worded in this way because we tried to keep them intact. Therefore, present these items as written, but use common sense in scoring. In many cases, mother will volunteer the information that *he used to do that, but not any more.* If there is any doubt, make appropriate inquiries.

This problem is not likely to occur when the interviewer is fairly clear about the child's developmental age and can start very close to the basal level. This is not too difficult in the early subscales. It can be more difficult, however, to assess the child's level in areas covered

by later subscales (e.g., *personhood, comprehension, sequence*). Here the interviewer may have to start considerably below the child's chronological age in order to get a basal score, and this problem is then more likely to occur.

7. Does? vs. Can?

Some questions are introduced with *Does the child...?* Others begin with *Can...?* It is very important to respect the distinction between these two forms. *Can* questions attempt to determine the child's capabilities, whether or not he habitually engages in the behaviour. *Does* questions attempt to determine whether the child as a rule and on his own initiative displays the capability in question. For example, a child who is able to dress himself, but rarely does, either because he prefers not to, resists, or because the mother prefers to do it herself, would be credited + if the question reads *Can...?* but - if it reads *Does he dress himself?*

8. Underlining

Those portions of an item which are underlined generally represent the focal issue to which a question is addressed. The underlining is for the interviewer's benefit, to assist in probing and evaluating the parent's response. Consider, for example, the following Alpern and Boll item:

Does the boy engage in bike riding, ball throwing, playing at a creek, or woods, or field, or hiking in a loosely organized boys' group?

The point of this question is not simply whether the child engages in any of these activities, but whether or not he does so with a group of other boys.

9. Classroom items

There are between 8 and 12 items that may be responded to differently depending upon whether classroom or home behaviour is being described. If a mother *spontaneously volunteers* that the child engages in the behaviour at home, score the item +. If the mother says *I don't know* or *no*, inquire if she thinks the child demonstrates the behaviour in class. If the child does, then score the item **CL+**. This primarily applies to the following items: **PL6, PR2, PR5, COM4, COM5, COM7, COM10,** and **COM13.** Items **PL7, PL9 (PS7),** and **SE12** may also be involved.

CL has been placed next to each of these items on the copy of the scale as a reminder to question the mother about classroom behaviour if her response is negative.

SOCIAL DEVELOPMENT SCALE

1. EATING

E1 (1-1½)

Does the child use a cup or glass for drinking without help? S(he) may hold it in any manner and with enough skill to allow only occasional spilling. SH8

E2 (1-1½)

Does the child use a spoon without help and with very little spilling? SH9

E3 (1½-2)

Does the child use a fork for eating solid foods when a fork is available to him(her)? S(he) may prefer a spoon but has shown the ability to use a fork. SH12.

E4 (2-2½)

Does the child completely feed himself using a fork and/or spoon and glass in the right way? SH15

E5 (2½-3)

Is the child able to pour from a pitcher into his(her) glass?

E6 (4)

Does the child have definite likes and dislikes regarding what s(he) eats [e.g. does s(he) prefer to choose his(her) own menu and even serve himself]?

E7 (5)

Does the child usually use a table knife for putting butter or jam on bread and crackers? SH25

E8 (6)

E9 (7)

Does the child typically use the proper utensil for the food being eaten [e.g. fork for meat, spoon for soup, knife to cut only, etc.] in keeping with the standard of his(her) family? SH33

E10 (8)

Has s(he) begun to cut meat with a knife? (The child need not be skillful.)

E11 (8)

Is s(he) aware of good manners and use them at appropriate times (e.g. company, visiting, restaurants)? S(he) need not use these good manners at home but s(he) must understand that they are expected and required of her(him) on special occasions.

E12 (9)

Does s(he) eat the same, or nearly the same meal as the adults?

2. TOILETING

T1 (1-1½)

Does the child [or did s(he) ever] indicate wet pants or puddles to you (usually by pointing)?

T2 (1½-2)

Does the child let you know that s(he) wants her(his) dirty diaper to be changed? This must be more than merely crying from discomfort: s(he) must be aware that the diaper needs to be changed and s(he) must let someone know.

T3 (2-2½)

Does the child show by asking or gestures the need to go to the toilet? The gestures must be more than just acting jumpy. They must show the child is trying to let someone know that s(he) needs to go to the toilet. S15

T4 (2½-3)

Does the child attempt to wipe himself?

T5 (3-3½)

Does the child care for his(her) own toilet needs without help? This means that s(he) must undress, wipe, and dress himself. The child does not have to be able to fasten back or tie bows to pass this item. SH19

T6 (3-3½)

Does the child have no more than one toilet accident per month? This includes waking and sleeping and both bladder and bowel accidents. SH20

T7 (5)

Does the child go to the toilet without mentioning it to an adult (taking care of it completely, including wiping)?

3. DRESS

D1 (1-1½)

Does the child take off his(her) shoes or socks without help? The shoes may be unfastened before s(he) takes them off. This must be undressing, not just a form of play. SH7

D2 (1½-2)

Does the child take off his(her) own coat without help when buttons or zippers are undone? SH11

D3 (2½-3)

Does the child put on his(her) own coat, without help? This need not include buttoning the coat. SH16

D4 (2½-3)

Does the child undo large buttons, snaps, shoelaces, and zippers? SH17

D5 (2½-3)

Does the child put on his(her) own shoes? It is not necessary that the child put them on the right feet or tie or fasten them to pass this item. SH18

D6 (4)

Does the child dress himself completely except for shoelace tying and other difficult fastenings? The child must manage regular shirt or blouse buttons and zippers. SH22

D7 (5)

Does the child show an interest in dressing neatly? [e.g. does s(he) take the time to tuck in shirts or blouses, button properly, lace shoes, and/or view his(her) appearance in a mirror]?

D8 (7)

Can the child tie his(her) own shoelaces [even if s(he) would rather not bother]?

D9 (8)

Does the child usually decide what to wear? This includes choosing the proper kinds of clothes for school, dress-up occasions, and outer-clothing appropriate for the weather. SH34

D10 (9)

Does the child take full responsibility for dressing him(her) self [including doing his(her) own hair]? S(he) must do it without any supervision, so that you no longer need to be involved in his(her) dressing in any way.

4. BATH

B1 (1½-2)

Does the child try to wash and dry his(her) hands? [S(he) cannot do it well as yet].

B2 (2-2½)

When the child's hands have been washed, does s(he) dry without help?

B3 (3-3½)

Does the child usually wash his(her) own face and hands acceptably and dry them without help? SH21

B4 (4)

Does the child brush his(her) teeth by himself?

B5 (5)

Does the child bathe her(him)self to some extent [e.g. her(his) hands and knees when taking a bath]?

B6 (6)

Does the child brush or comb his(her) hair well enough so that adult help is not usually needed except for special times? SH29

B7 (7)

Does the child wash himself acceptably without help? This means getting a bath or shower ready and washing and drying himself completely. SH32

B8 (8)

Can the child keep his(her) fingernails clean by himself, and cut the nails on one hand?

B9 (9)

Does the child decide himself(herself) to take a bath 2 or 3 times a week...and do it?

5. SLEEP

SL1 (1-1½)

Does your child still take a nap? If so, does he/she take one nap a day?

SL2 (1½-2)

Has your child tried to postpone going to sleep at night (e.g. with special requests, or refusal to get into pajamas)?

SL3 (2-4)

Does the child have special bedtime rituals that must be followed? Can you describe the rituals?

SL4 (5)

In the morning, after awakening, does s(he) keep her(him)self busy until it is time for the rest of the family to get up?

SL5 (6)

Does the child want you to spend special time with him(her) before bed [e.g. s(he) may want you to read to her(him), or go over the day's experiences]? (If yes,) what kinds of things would you do? (Note to interviewers: To score here, the contact must be more informal and flexible than the special rituals of a younger child and must be initiated by the child. It does not have to be something done routinely every night.)

SL6 (6)

Does s(he) sleep through the night, although he may get up for the toilet which he manages himself?

SL7 (7)

Does s(he) usually sleep soundly without waking at all, either because of nightmares or toileting?

SL8 (7)

Does s(he) get ready for bed yet, with only a little help from you?

SL9 (8)

Has s(he) ever needed time to "quiet down" before being ready to fall asleep [versus "falling off" as soon as s(he) hits the pillow]?

SL10 (9)

Does s(he) get ready for bed yet completely by himself?

SL11 (9)

Does s(he) have special things in his(her) room that s(he) does alone before going to sleep--like reading, or watching T.V.? [S(he) may do this too long and need reminding.]

SL001 (Fears)

Does your child have [or did s(he) ever have] any fears in relation to sleeping or the dark? How are they expressed and how do you (did you) handle them?

S1002 (Nightmares)

Many children have nightmares or bad dreams. In fact, at certain ages they are quite common. Does your child have nightmares? What age? Do you know what they were about? How did s(he) tell you?

6. PLAY & PASTIMES

PL1 (1-1½)

Is the child interested in things or games other children like? S(he) may not be able to share and take turns with other children but s(he) likes their toys and games. S9

PL2 (1-1½)

Does the child keep her(him)self busy and happy for at least 15 min. with one of the following activities: T.V., coloring, marking with a pencil, building, looking at pictures or other similar activity? S(he) may also do this alone or with other children his(her) age, but s(he) does not pass if s(he) needs outside adult supervision. S7

PL3 (1½-2)

Has the child ever liked to imitate things like reading a newspaper, sweeping, dusting, answering the phone?

PL4 (1½-2)

Has the child ever liked to scribble* with a crayon on a piece of paper? The scribbling may go off the paper, but it must start on the paper. *scribble, not just marks.

PL5 (2-2½)

Does the child like to help the parents around the house? Does s(he) enjoy such activities as picking up from the floor, putting raked leaves in a basket, setting or clearing the table? S14

PL6 (3-3½)

Is the child able to keep "working" for at least 30 minutes with a similar-aged child in a single task such as making buildings or roads with blocks, logs, sand or mud or rearranging a room or area for doll-play such as store, school or house? (Note to interviewer: score as "no friends" if child has not friends to work with. Check with school if mother does not know.) S20

PL7 (4)

Does the child engage in "dramatic play" (such as house, school, store, traink spaceman, or hospital), using costumes and props? In this play the child must assume a role, i.e. pretend s(he) is someone else.

PL8 (5)

Has the child ever tried (or wanted to try or shown interest in) roller skates, ice skates, jump rope, or stilts? (Note to interviewer: If skills listed are not appropriate because of lack of opportunity, ask parent to supply other skills requiring balance and co-ordination, that the child is able to engage in and record these. Also, only record activities that child shows a real interest in.)

PL9 (6)

Does s(he) like to play games with rules (e.g. checkers, old maid, marbles, shakes and ladders). Must follow some sort of rules even if they are modified family rules and must appreciate the idea that there is a right way to play. If no exposure, score as "no opportunity.

PL10 (6)

Does the child like to try stunts and tricks, as on swings, ropes, bicycle, or skates? S(he) is so competent and secure on the equipment that s(he) can experiment with different ways of using it.

PL11 (7)

Has the child, by himself, built or mended something requiring real tools such as needle and thread or hammer and nails. Adults may have helped only with directions, not any of the work. Sewing up a seam or fixing a wagon exemplify passes. SH31

PL12 (8)

Is the girl showing interest in any of the following feminine activities: cooking, spending the night with a girlfriend, having stylish clothes?
Is the boy showing interest in musculine things such as: mechanical tinkering with real objects (not toys) such as bike, go cart, or engaging in formal team sports?
(The activities must be initiated by the child and carried out independently of the mother.) S34

PL13 (9)

Does s(he) have any special collections (e.g. stamps, rocks, dolls) which the child keeps up, and organizes? or Does the child have an especially favorite outdoor sport (e.g. baseball, skating, swimming) that s(he) devotes a lot of time to?

PL001 (TV & Movies)

For 3-7 years
Does the child watch TV and how often? What kinds of programs does s(he) like? When did s(he) start watching?
For 7 years
Does s(he) ever go to the movies? When did s(he) start going to the movies?

PL002 (Special Lessons)

For 7 years
Is your child taking any kind of special "lessons" outside of the school curriculum (e.g. art, gymnastics, special sports, theatre or mime)?

7. PERSONHOOD

PH1 (1-1½)

Does s(he) [or did s(he) ever] actively refuse things by bodily protest?

PH2 (1½-2)

Does the child show jealousy of attention given to other persons, especially family members. Jealousy may be shown by anger, babyish behavior, noisiness, asking to be held, or other expressions of displeasure. S10

PH3 (2)

Young children often "defend" their "rights" and possessions by kicking, grabbing, pulling hair, etc. Does the child ever do that (or did s(he) ever do that)?

PH4 (2)

Does the child know his(her) own name yet and does s(he) refer to him(her)self by that name? [How does s(he) do this? How does s(he) show you that s(he) is aware of His(her) name? If no, has parent tried? (Possibly this item has not been taught yet by the parent.)

PH5 (2-2½)

Does the child show s(he) knows his(her) own sex or the sex of others by telling what someone's sex is? Child may pass by showing s(he) knows that certain clothes, activities or toys usually go with one sex or another. S13

PH6 (2½-3)

Has the child ever demanded to do things by him(her)self even though s(he) may not be able to do it?

PH7 (2½-3)

Does the child try to get the attention of adults to see something s(he) is doing that s(he) feels is special? How does s(he) convey this "Look at me!" message?

PH8 (3-3½)

Does the child ever [or did s(he) ever] refuse to hold your hand while walking (except at the crossing)?

PH9 (3½)

Young children often admire their own productions whether of clay, paint, paper or blocks. They might exclaim, "Look what I made!" Do you think the child ever has that feeling about his(her) work, and if so, how does s(he) show it?

PH10 (4)

Does the child like to "dress up" in good clothes or new clothes [i.e. is s(he) aware of looking special and like that idea]?

PH11 (4)

Has the child ever appeared to resent holding your hand when crossing the street? (Note: possibly, depending on where the family lives, there may be no opportunity to cross streets.)

PH12 (4)

Children often show off and brag about their possessions. They seem to be feeling "Look what I have; aren't I terrific!" Do you think the child ever has this feeling and if so, how does s(he) show it: (or how do you know)?

PH13 (5)

Has the child asked questions about his(her) own body e.g. heartbeat, where food goes, or the differences between his(her) own and the other sex? S25

PH14 (5)

Does your child ever try something that is quite difficult for him(her) just because s(he) has seen another child do it? S(he) wants to be "as good" or better than the other child, or may be afraid of being teased or made fun of. Can You give an example? (Note to interviewer: this item involves rivalry and competition, rather than identification and emulation.)

PH15 (5)

Often children are aware that something is their fault, but they don't want to admit it. So they try to put the blame on someone else. Has the child ever done anything like that? How would you know [i.e. how would s(he) communicate to you] that s(he) was trying to blame someone else?

PH16 (6)

Does the child want his(her) name written on things that s(he) owns or has produced? Or does s(he) ever look for letters addressed to him(her)?

PH17 (7)

Has the child ever expressed a wish to have something that is especially his, and belonging to no one else in the family--such as his(her) own room; his(her) own special place at the table or in the car? How has this been communicated to you?

PH18 (7)

Has the child ever seemed to worry about doing things wrong or about being made fun of [e.g. has he been afraid of being late for school, or has s(he) been ashamed if s(he) were seen crying]? Can you give an example, and describe how this has been communicated to you. (Note: the child must be able to think about something either before it happens or after it happens; not good enough to seem upset while something is happening.)

PH19 (8)

Does the child have certain things of his(her) own that he keeps very tidy [e.g. takes special care of them and may want a special place of his(her) own in which to keep them]?

PH20 (9)

Has the child ever apologized [on his(her) own] when s(he) has done wrong? In other words, has s(he) ever seemed truly ashamed or sorry and wished to make up for it in some way? How was this communicated to you?

8. PEER RELATIONS

PR1 (2-3)

Does the child ever play with other children? There may be very little real interaction or social give and take. There may even be some grabbing, or snatching, pulling or kicking. But nevertheless, s(he) seems to enjoy being with other children.

PR2 (3-3½)

When the child plays with other children, have you noticed as yet any co-operative play e.g. some sharing or waiting turns (though the physical pushing and shoving, etc. may still also occur)?

PR3 (4)

Does the child as yet show a real preference for being with other children, rather than with adults [e.g. does (s)he talk about or seek special friends; when s(he) is on outings, visits, or when there is company; does s(he) seem to feel happier if they are around)?

PR4 (4)

Has the child ever spontaneously taken care of a younger or shy child without anyone telling him(her) to do that?

PR5 (5)

Does the child yet play with other children without any physical fighting and quarelling? Does s(he) seem more interested now in the things the children are doing together than in defending her(his) rights and getting the most and so on?

PR6 (5)

Boy:
Does the boy engage in bike riding, ball throwing, playing at a creek, or woods, or field or hiking in a loosely-organized boys' group? S26
Girl:
Does she play with girlfriends at least once a week in some activity like house, shopping or nurse?

No rules or scores are needed and the activity is just one where the child prefers to be with a friend of her own sex.

PR7 (6)

Does the child have a friend to whom s(he) will relate things that s(he) would not let parents or other adults know? This does not mean merely acting silly with friends, but rather telling secrets to another child that s(he) does not want adults to know. S28M

PR8 (7)

Some children judge their friends or classmates' behavior (e.g. it's bad or silly or "stupid") and they tell adults or other friends or classmates about it. Does the child make judgments about other children's behavior and let others know about it in this way? Can you give an example of how s(he) does this?

PR9 (8)

Does the child have a "best friend" yet? S(he) may fight with him, argue, but it is in the interest of really trying to settle problems between them. S(he) must really care about his(her) friend's attitudes and feelings and consider them. Does the child seem to care about another child in this way and how do you know this?

PR10 (9)

Does the child often prefer being somewhere away from home and family (a friend's house) in order to be with friends of his(her) own? S38

PR11 (9)

Has the child ever shown any interest in "gangs" or "clubs" ...either organized groups like Cubs or Brownies, or a more loosely organized "club"? The "club" may be short-lived, but while it is "on", s(he) really wants to get along with the group.

9. PERSONAL SPACE

PS1 (1½-2)

Does the child seem interested in exploring new places such as a friend's house or places in his(her) own home or yard which are new to him? Exploring with eyes alone is not sufficient to pass this item. S12

PS2 (2-2½)

When out for a walk, does the child [did s(he) ever] like to walk on curbs, ledges, low walls, rocks or fences?

PS3 (3-3½)

Does the child play with other children in group games such as tag, hide-and-seek, hopscotch, jump-rope, marbles or other popular games without needing constant watching by an adult? S19

PS4 (4)

Is the child allowed to play in his(her) own neighborhood without being watched by an adult or babysitter? This does not mean the child is allowed to cross the street by him(her)self. S23

PS5 (5)

Can the child safely cross streets as yet, if they are not too hazardous?

PS6 (6)

Can the child visit and play at a friend's house without needing watching by an adult (except for once-a-while checking no more than every hour)? The friend should be no more than one year older than the child. S29

PS7 (7)

Can the child get around his(her) school pretty well if given directions? [e.g. does s(he) go on errands for the teacher, and know where different rooms are?]

PS8 (8)

Some children like to take short-cuts. They may even go out of bounds, on to neighbor's property in order to do this. Does the child like to do this?

PS9 (8)

Could your child go someplace on the bus, if you put him(her) on it, and had the bus met by someone?

PS10 (9)

Is the child allowed to go anywhere outside his(her) neighborhood (more than four blocks or one mile away) by him(her)self? S37

10. COMPREHENSION

COM1 (1½-2)

Does the child know the difference between food and things which cannot be eaten? Although s(he) may put something other than food in his mouth, s(he) will not chew and swallow it. SH10

COM2 (1½-2)

Is the child able to play with an easily breakable toy without destroying it right away? The toy may eventually be broken, but the child must show that s(he) knows the right way to use the toy and be able to play with it once or twice without breaking it. S11

COM3 (2-2½)

Does the child understand concept of danger even if he choose to ignore it or stay away from common dangers such as taking care not to fall on stairs or from high places or s(he) may show that s(he) knows the danger of things such as broken glass, busy streets, or strange animals. (Any one item scores a pass but be sure to inquire in depth.)

COM4 (2½-3)

Does the child follow the rules in group games run by an adult? Such rules might mean being able to sit in a circle and follow directions or imitate a leader, or doing the same things as the rest of the group. (Note: Be sure to check for NP, NF and classroom scores.) S16

COM5 (2½-3)

Is the child able to take turns? Although s(he) may need some help, s(he) understands the idea of waiting for someone else to go first; s(he) is able to allow others to go first before s(he) takes her(his) turn 75% of the time. S17

COM6 (2½-3)

Does the child know what toys can and cannot do and does s(he) use them in a way that would not break them? For example, s(he) does not drag a wagon on its top instead of its wheels, does not use a toy gun for chopping down a tree, and knows that cardboard toys cannot be stepped on. Any of these things may once in a while happen, but they don't usually happen. S18

COM7 (3-3½)

Does the child show s(he) knows that some things belong to other people by getting permission before using them rather than just taking them? Does s(he) also know that the owner has first choice or may not let the child have it at all? [It is not just knowing that the truck is not his (hers) but that s(he) may be refused permission and the child has to accept it.] Can you give an example how s(he) shows this? S21M

COM8 (4)

Does the child wait for you at the crossing? [S(he) may run ahead of you before that, but s(he) knows not to cross by her(him)self].

COM9 (4)

Young children often know and use (though not always) the terms "thank you" and "please" at the right times (i.e. they must be initiated by child and used in context). Does the child do this, or something like that? Can you tell us how s(he) communicates these formal manners? S24M

COM10 (5)

Does the child understand that rules must be followed? [e.g. Does s(he) understand that s(he) must get to school on time or that s(he) must ask permission for certain things? Does s(he) often follow the rules without being reminded?] Can you give an example(s) of a rule(s) s(he) knows and how s(he) shows you that s(he) is aware of it.

COM11 (5)

Some children show that they know how others feel by saying things like "He is mad", "He is angry", "She is afraid", or "You are cranky"! And they may be right! Do you think the child can correctly identify feelings and if so how does s(he) let you know? (Note: at least two different emotions must be identified in another person; child must recognize the emotion and label it correctly.) S27M

COM12 (5)

If the child saw someone arrive at the house when you were not near the door, would s(he) know how to greet or respond to the person? Would s(he) come to get you and let you know who it was? SH26M

COM13 (6)

Does the child play easy table games such as checkers, Old Maid, Candy Land, or Lotto with a friend of about the same age (give or take one year)? The child should be able to follow the rules, take turns and have a "winner". (Note: score strictly.) S30

COM14 (6)

Does the child judge her(his) own behavior as "good" or "bad" [e.g. does s(he) know when s(he) is being a "good boy/girl" or "bad boy/girl"]? How do you know s(he) has this concept (or appreciates this difference)?

COM15 (7)

Does the child know about voting as a way of deciding something? The child must understand that things are to be done in accordance with the way most of the people vote. S32

COM16 (7)

Does the child know what "Miss" and "Mrs." mean and use them correctly? If yes, how does s(he) show that? If no, does s(he) have some special way of addressing Doctors and/or her(his) teachers. Does s(he) give them some kind of title? How is this communicated? S33M

COM17 (8)

When the child is doing or wants to do something you don't want her(him) to do, can you reason with her(him) to change her(his) mind? How would you do this? Can you give an example of an occasion when you were able to reason with her(him) to change her(his) mind?

COM18 (8)

Does the child know that Santa Claus, the Easter Bunny, and the Good Fairy are not real? The child may get very excited about Christmas and even say s(he) is looking forward to Santa Claus or s(he) may hide her(his) teeth under the pillow for the Good Fairy, but s(he) knows that they are not real. Asking if Santa Claus is real is not enough. The child must have come to know that these are not real people. (How do you know? How expressed?) S36

COM19 (9)

Do you think the child understands the idea of things being "fair" or "not fair" [e.g. does s(he) ever seem to think that something is not fair.....a teacher's punishment]? How would s(he) express this? How would you know?

11. RESPONSIBILITY

R1 (3)

Can the child put her(his) toys away when asked to, though if may require supervision?

R2 (4)

Does the child put toys away neatly when asked to do so? (Child may often have to be asked more than once.) SH23

R3 (5½)

Does the child have a small chore as yet [in exchange for which s(he) may get a small allowance]? S(he) need not do it very well, but s(he) knows it is expected of her(him).

R4 (6)

Does the child often do household chores which do not need redoing by an adult? Doing the tasks after being told to do them is acceptable. SH30

R5 (7)

Does the child have at least one real chore which s(he) has to do at least weekly, such as washing dishes, mowing lawns, making a bed, taking out garbage cans, or some clearning or dusting? This should be done well and usually without urging more than two times. S31

R6 (8)

Does the child have at least two jobs of taking care of her(his) own room or clothes? Washing, ironing clothes, shining shoes, cleaning, dusting her(his) room or making her(his) own bed are examples of chores that pass. Needing to be reminded to do the chores is allowed. SH35

R7 (8)

Can the child work at home chores, for one half hour, following a list on her(his) own and doing them acceptably without needing constant reminders? S35

R8 (8)

Does the child watch her(his) own money (savings or allowance), well enough that s(he) is allowed to buy some things on her(his) own without asking or telling adults? SH36

R9 (9)

Does the child shop for a group of items? This means the child can go to more than one store, if all items are not available in one store, as well as being able to account for money spent and change received. SH37

R10 (9)

Is the child responsible enough to be given the sole care of an animal needing only a little adult help? This care includes feeding, cleaning and housing, and would be done on a regular basis (daily) without needing to be constantly reminded. SH39

R11 (9)

Does the child, when by himself, buy useful articles like gifts for others or family groceries? S(he) must choose appropriate items, obtain correct change and know amount needed for what s(he) wants. S39

12. SEQUENCE

SE1 (1-1½)

When told, does the child bring something from or take something to some place? S9he) must be able to find the object from instructions and carry out some orders such as "bring it here" or "take it to Mommy". How do you indicate such messages to her(him)? S8M

SE2 (1½-2)

Can the child build a tower of 3 or 4 blocks?

SE3 (1½-2)

Does anyone ever look at picture books with the child? [If yes, when looking at a book that s(he) knows well, does s(he) seem to know what pictures are coming next? How do you know this? How would s(he) express it?] [If no, write N.A.]

SE4 (2-3)

Do you ever leave her(him) with a babysitter or other family member? If so, when you leave her(him) with someone else, does s(he) seem to understand that you are coming back [i.e. Can you reassure her(him) that you are coming back later and does s(he) seem to understand this? How do you do it?]

SE5 (2-3)

Has anyone ever "read" a simple picture book with a story to the child? [If necessary, explain that "read" means relate the story in whatever way you can.] If no, write N.A. If yes, ask: when the story is a familiar one, does s(he) seem to know what will happen next as the story goes on? How can you tell?

SE6 (3-3!)

When you go out for a walk, or for a ride in the car, does the child definitely know that there is a destination to be reached [i.e. does s(he) know that s(he) is going to some place else]?

SE7 (3-3½)

Does the child seem to know on her(his) own what will happen next in her(his) day [e.g. before and after meals .....s(he) knows and expects that daily events will happen in a certain order without your telling her(him)]

SE8 (4)

Can the child fix a bowl of dry cereal for her(him)self? This must include getting the bowl and the cereal and pouring both cereal and milk into the bowl? SH24

SE9 (4)

Does the child draw a person so that an adult could tell what s(he) drew? It need not be a whole man but should have a head and a boy or a head and eyes, nose, and mouth which any adult could recognize. S22

Date of Administration: _____

#: _____

PHYSICAL SCALE

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yes no 1. Does the child walk up stairs (upright not crawling) using a wall or hand rail or a person's hand? Putting both feet on each step rates a pass.

yes no 2. Does the child walk well enough, without support, that he is able to walk about the house unwatched without falling or bumping into objects?

yes no 3. Does the child take the paper off candy bars or gum or any other wrapped object?

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yes no 4. Does the child pitch, toss, or fling objects for at least three feet in a direction he wants? Just throwing things which go in <u>any</u> direction does not rate a pass.

yes no 5. Does the child go upstairs taking one stair with each foot? He must alternate going upstairs but may still be putting two feet on each step going downstairs.

yes no 6. Does the child ride a 3-wheeler <u>using the pedals</u> for at least 10 feet and turning wide corners?

---

yes no 7. If you were to draw a straight line for the child, could he copy it using a pencil, crayon, or paintbrush? The question is whether the child has enough eye-hand ability to copy a line instead of just scribble.

yes no 8. Does the child jump without falling with both feet together from any object which is at least eight inches off the floor (such as a step or box)?

yes no 9. Can the child move from place to place by jumping or leaping with two feet together? He must be able to go at least 10 feet in this way.

---

yes no 10. Does the child use scissors with one hand to cut paper or cloth? The child must be able to use the scissors to cut rather than merely tear.

yes no 11. Can the child hop on one foot for at least five feet?

yes no 12. Does the child usually walk upstairs and downstairs by placing only one foot on each stair? He may hold railing but this should not be necessary for ordinary support or balance.

SE10 (5)

Is the child able to fix a sandwich? S(he) must be able to get the right foods from the refrigerator, cabinet and/or breadbox and put them together in a sandwich. SH27

SE11 (5)

When painting a picture, does the child appear to begin with an idea of the finished product in mind?

SE12 (5)

Has the child ever "pretended" situations that involve different things happening in the right order [e.g. if s(he) plays house, does s(he) show morning, noon and night time activities in the right order; or if s(he) plays cowboy, or "spaceman" or doctor, is there a meaningful sequence or story that is told]?

SE13 (6)

Is the child aware that seasons change and that certain activities go with each season [i.e. season related activities and that s)he) will be able to go sledding once again when winter comes again]. Note: To pass, the child must know all four seasons.

SE14 (7)

Does the child know that s(he) (and others) must be on time for certain things [e.g. does s(he) ever hurry so s(he) won't be late for school or other appointments]? S(he) must hurry on her(his) own, not just when told by someone else to hurry.

SE15 (8)

Can the child tell time yet? (To score the child must be able to use the clock face the way an adult would, i.e. a quarter to nine, five past eigth, etc.)

SE16 (8)

Does the child look forward to future events and indicate that s(he) "can't wait"? How does s(he) demonstrate this?

SE17 (9)

Has the child prepared at least two of the following foods without help: eggs (any style), popcorn, canned or packaged soupd, cake, hot cereal, pudding or jello? S38

SE18 (9)

Does the child ever plan a schedule for his day [by her(him)self] or even make plans way ahead for her(his) adult future?

---

yes no 13. Can the child throw a ball (any size) to an adult standing five feet away well enough so that the adult can catch it without having to move?

yes no 14. Does the child release the latch and open an inside door? He must be able, for instance, to twist a doorknob and push open an unlocked bathroom door.

yes no 15. Can the child cut out a printed circle the size of a silver dollar without being off more than a quarter of an inch anywhere?

---

yes no 16. Does the child catch a ball (any size) thrown by an adult standing five feet away? The child must catch the ball 50% of the time.

yes no 17. Can the child hop on one foot for at least 10 feet without having to stop and start again?

yes no 18. Does the child jump rope at least twice on one or both feet: or can the child jump over a number of things in his path without stopping? The "things" should be at least eight inches high.

---

yes no 19. Can the child use a key to open and unlock a small padlock?

yes no 20. Can the child make a snowball or mud ball solid enough to stay together when thrown at least eight feet? The ability to throw a snowball or mud ball eight feet is necessary to rate a pass.

yes no 21. Does the child play hopscotch or a similar game requiring skilled hopping? He must be able to hop on one foot into a marked spot, without falling, hop-turn around and repeat the jumps.

---

yes no 22 Does the child roller skate or ice skate? Skating means the child can push and glide with one foot after another. There can be occasional falls but most of the time the child can travel long distances without falling.

yes no 23. Can the child cut out a magazine picture of an animal or human without being more than a quarter of an inch off anywhere?

yes no 24. Does the child skip rope? The child must be able to hold both ends of a jump rope and skip, hop, or jump three times in a row while flipping the rope over his head and under his feet.

---

yes no 25. Can the child pick up and carry a kitchen or dining-room chair from one room to another?

yes no 26. Can the child run fast enough to compete with an average eight-year-old child in a race or game of tag?

yes no 27. Can the child catch a ball - tennis size - with one hand when thrown gently from at least six feet away? (The child must catch it at least 50% of the time.)

Appendix F
PARENT INTERVIEW

APPENDIX F
Premail Questionnaire and Parent Interview

January 16, 1979C
(Not to be copied or reproduced without permission)

No. ____

PREMAIL QUESTIONNAIRE

FAMILY MEMBERS

Please fill in the following information about the people in your family.

A. SELF: _____

Relationship to Child: _____

Country of birth: _____

B. SPOUSE OR PARTNER

First name: _____

Relationship to Child: _____

Country of birth: _____

C. CHILDREN. List all of your children below. Indicate their sex, age, country of birth, and whether or not they are currently living at home. (Do not include your hearing impaired child on this list.)

	Name	Sex	Age Yrs	Age Mos	Country of birth	Living at home
1.	_____	___	___	___	_____	1. Yes 2. No
2.	_____	___	___	___	_____	1. Yes 2. No
3.	_____	___	___	___	_____	1. Yes 2. No
4.	_____	___	___	___	_____	1. Yes 2. No
5.	_____	___	___	___	_____	1. Yes 2. No
6.	_____	___	___	___	_____	1. Yes 2. No

D. OTHER PEOPLE LIVING IN THE HOME ON A PERMANENT BASIS

	Name	Relationship
1.	_____	_____
2.	_____	_____

E. Is there anyone outside of the immediate family like a babysitter or a grandparent, who is with your child a great deal of the time? If so, please list them below.

	Name	Relationship
1.	_____	_____
2.	_____	_____

F. Do any of these people also have a hearing loss? 1. Yes 2. No

G. Does anyone else in your family have a hearing problem, like grandparents, or aunts or uncles? 1. Yes 2. No

BIRTH HISTORY

H. When was your hearing impaired child born? _____ (month) _____ (day) _____ (year)

I. In what country was he/she born? _____

J. Was there anything unusual about the pregnancy? 1. Yes 2. No

If "Yes," please describe: _____

_____

_____

K. Was the birth premature? 1. Yes 2. No

If "Yes," how early was it? _____ (weeks)

L. Were there any complications surrounding the delivery? 1. Yes 2. No

If "Yes," please describe: _____

_____

_____

M. What was the baby's weight at birth: _____ (lbs) _____ (oz)

N. Was the baby's condition at birth, or in the first week following birth, abnormal in any way?

1. Yes 2. No

If "Yes," please describe: _____

_____

_____

_____

O. How long was the baby in hospital before going home? _____

P. Were there any medical problems in the first few months, or was the baby's behavior abnormal in any way?

1. Yes 2. No

If "Yes," please describe: _____

_____

_____

_____

_____

BIRTH HISTORY CONT'D

Q. Which of the following childhood diseases has your child had?

_____ Mumps	_____ Diptheria
_____ Red Measles	_____ Whooping cough
_____ German Measles	_____ Pneumonia
_____ Scarlet fever	_____ Frequent colds
_____ Chicken pox	_____ Allergies
_____ Meningitis	_____ Ear infections _____ recurring

R. Has he/she had any other illnesses or medical problems?

1. Yes 2. No

If "Yes," please describe: _____

_____

_____

DIAGNOSTIC HISTORY

We're interested in how you found out that your child had a hearing loss.

S. As best as you can tell, was your child deaf at birth?

1. Yes 2. No

If "No", when do you think the deafness was acquired? _____ (yrs) _____ (mos)

T. What do you think is the cause of the deafness? _____

U. How old was your child when you first suspected that he/she had some sort of problem? _____ (yrs) _____ (mos)

V. How old was he/she when you first sought protessional help? _____ (yrs) _____ (mos)

W. Who did you consult at that time? (Circle one)

1. Public health nurse
2. Family doctor
3. Pediatrician
4. Doctor specializing in hearing problems
5. Audiologist
6. Other _____

X. Did you consult any other professionals? 1. Yes 2. No

If "Yes," how many different places did you go to? _____

Which of the following types of professionals did you see? (Circle each one that applies)

1. Public health nurse
2. Family doctor
3. Pediatrician
4. Doctor specializing in hearing problems
5. Audiologist
6. Other _____

DIAGNOSTIC HISTORY CONT'D

Y. How old was your child when you learned that he/she definitely had a hearing loss? _____ (yrs) _____ (mos)

Z. How many other hearing tests has your child had since that time? _____

AA. Does your child have any handicaps other than deafness?

1. Yes 2. No

If "Yes," please indicate

Type of handicap: _____

Where diagnosed: _____

Age of onset: _____ (yrs) _____ (mos)

BB. Do any of your other children have handicaps other than deafness?

1. Yes 2. No

If "Yes," please describe: _____

_____

HEARING AID HISTORY

CC. Has your child ever had a hearing aid?

1. Yes 2. No

If "Yes," please describe each one below.

1. Make: _____

Type of aid:

1. single ear level aid
2. two ear level aids
3. body aid - monaural
4. body aid - binaural with Y chord
5. body aids - binaural
6. other _____

Age of child when aid obtained _____(years) _____(months)

2. Make: _____

Type of aid:

1. single ear level aid
2. two ear level aids
3. body aid - monaural
4. body aid - binaural with Y chord
5. body aids - binaural
6. other _____

Age of child when aid obtained _____(years) _____(months)

3. Make: _____

Type of aid:

1. single ear level aid
2. two ear level aids
3. body aid - monaural
4. body aid - binaural with Y chord
5. body aids - binaural
6. other _____

Age of child when aid obtained _____(years) _____(months)

EDUCATIONAL HISTORY

DD. Please describe all of the educational programs your child has attended, including the current one(s). Include any type of educational or language program: nursery school, speech therapy, private tutoring, hospital out-patient program, visiting teacher, etc.

1. Type of program: _____
   Offered by: _____
   Teacher: _____
   Date of enrolment: _____ (year) _____(month)
   Date of withdrawal: _____ (year) _____(month)
   How often were sessions or classes held: _____
   How long were the sessions or classes: _____

2. Type of program: _____
   Offered by: _____
   Teacher: _____
   Date of enrolment: _____(year) _____(month)
   Date of withdrawal: _____(year) _____(month)
   How often were sessions or classes held: _____
   How long were the sessions or classes: _____

3. Type of program: _____
   Offered by: _____
   Teacher: _____
   Date of enrolment: _____ (year) _____ (month)
   Date of withdrawal: _____ (year) _____(month)
   How often were sessions or classes held: _____
   How long were the sessions or classes: _____

4. Type of program: _____
   Offered by: _____
   Teacher: _____
   Date of enrolment: _____ (year) _____ (month)
   Date of withdrawal:_____ (year) _____ (month)
   How often were sessions or classes held: _____
   How long were the sessions or classes: _____

FAMILY INFORMATION

EE. How much schooling did you complete?

Grade School: ____
High School: ____
College: ____
University: ____
Postgraduage: ____

Are you currently working? 1. No 2. Yes: part-time 3. Yes: full-time

FF. If yes, what is your occupation? _____

GG. How much schooling did your spouse or partner complete?

Grade School: ____
High School: ____
College: ____
University: ____
Postgraduate: ____

Is he/she currently working? 1. No 2. Yes: part-time 3. Yes: full-time

HH. If yes, what is his/her occupation? _____

THANK YOU VERY MUCH

Interview scheduled for: _____(Date)

_____(Time)

March 8, 1979
(Not to be copied or
reproduced without permission)

No.: _____
Date: _____

PARENT INTERVIEW*

INTERVIEW DATA

Persons interviewed: 1. Mother 2. Father 3. Other _____

CHILD present: 1. Yes 2. No

Other children present: 1. Yes 2. No

INTRODUCTION

The first thing I'd like to do is just discuss the research study with you and answer any questions you might have. Then I'd like to collect some preliminary information from you and make an appointment to come back in a few weeks to do some testing.

Have you been told the basic purpose of the study, exactly what it is we're trying to do? SOLICIT PARENT RESPONSE AND DISCUSS STUDY TO FILL IN GAPS, COVERING THE FOLLOWING MAJOR POINTS: STUDY IS LONGITUDINAL, PURPOSE IS TO FIND OUT HOW WELL CHILDREN DO IN VARIOUS TYPES OF PROGRAMS AND DEVELOP CRITERIA FOR PLACING DIFFERENT CHILDREN IN PROGRAMS.

To do this we'll be collecting various types of information about your child. I think everything is pretty well summarized on this chart. SHOW CHART AND DISCUSS THE TYPES OF DATA TO BE COLLECTED, THE MANNER AND TIMING OF COLLECTION: CLINIC RECORDS, CLASS OBSERVATIONS, HOME INTERVIEWS, INDIVIDUAL TESTING.

Can we start by looking at the questionnaire we sent in the mail? Did you have a chance to fill it out? GO OVER THE QUESTIONNAIRE, CLARIFYING ANY AMBIGUOUS AREAS AND COLLECTING ANY ADDITIONAL INFORMATION THAT IS REQUIRED ACCORDING TO THE FOLLOWING FORMAT.

*A number of these questions were adapted from interview schedules constructed by Susan Gregory (The Deaf Child and His Family, London; Geo Allen and Unwin, 1977) and by Carol Erting and Kathryn Meadow (Kendall Demonstration Elementary School Mother-Child Interaction Project Interview Schedule (Short Form), n.d.

SECTIONS 1 THROUGH 22 ARE FOLLOW-UP TO THE MAILED QUESTIONNAIRE

(QE) 1. OTHER PERSONS SPENDING TIME WITH CHILD. How much time each week does CHILD usually spend with _____.

Person No.	Time
1	_____
2	_____

(QF) IF ANSWER TO "F" IS "NO," GO TO SECTION 3.

2a. You say that ( ) has (have) a hearing loss. Can you estimate how severe it is? Let me read you the following categories and tell me which one best describes his/her hearing.

1. Can hear loud noises.
2. Can tell one kind of noise from another.
3. Can tell the sound of speech from other sounds.
4. Can hear and understand a few words without seeing the speaker's face.
5. Can hear and understand what a person says without seeing the face and lips.

b. Has (s)he had this loss since birth?

FILL IN THE ANSWERS TO THESE QUESTIONS BELOW. CONTINUE WITH OTHER MEMBERS OF THE FAMILY WHO HAVE A LOSS.

	Name	(a) Degree of loss					(b) Onset Congen	Advent
1.	_____	1	2	3	4	5	1	2
2.	_____	1	2	3	4	5	1	2
3.	_____	1	2	3	4	5	1	2
4.	_____	1	2	3	4	5	1	2
5.	_____	1	2	3	4	5	1	2

(QU) 3a. MEDICAL AND AUDIOLOGICAL PROFESSIONALS CONSULTED. You said, that when you first suspected that CHILD had a problem, you consulted a ( ). What did (s)he tell you at that time?

_____

_____

_____

_____

3b. Were you given any kind of advice? 1. Yes 2. No

c. IF "YES," please describe: _____

_____

_____

_____

4. IF OTHER SPECIALISTS CONSULTED: What were you told by the other specialists you consulted? _____

_____

_____

_____

_____

_____

FILL IN RECORD INFORMATION ON PAGE 20.

5. Can you remember how you felt when you first suspected that CHILD had some sort of problem? _____

_____

_____

6. How did you feel when you learned that (s)he definitely had a hearing loss? _____

_____

_____

_____

7. How did your PARTNER feel? _____

_____

_____

_____

8a. Have there been any changes in your feelings since that time? 1.Yes 2.No

b. IF "YES," please describe: _____

_____

_____

_____

9a. How about your PARTNER? 1. Yes 2. No

b. IF "YES," please describe: _____

_____

_____

10. IF "YES" TO EITHER OF THE ABOVE: How did these changes occur?

_____

_____

_____

_____

11a. In general, how do you feel about the medical and audiological care your child received during this period? _____

_____

_____

b. Can you think of any ways it could have been made better? _____

_____

_____

_____

_____

(QAA) IF CHILD HAS NEVER HAD A HEARING AID, GO TO SECTION 19.

12a. You said that CHILD first received a hearing aid when (s)he was ( ) years old. Did (s)he ever wear the/an aid?
1. Yes 2. NO → GO TO SECTION 19.

b. When did (s)he start wearing it? _____

13. How much did (s)he wear the aid at the beginning? Can you estimate what percentage of his/her waking time the aid was worn? ESTIMATE ON THE BASIS OF TOTAL WAKING HOURS, EXCLUDING NAPS AND BATH TIME. PROBES: Did (s)he ever take it off, perhaps when playing in the sandbox, when roughhousing with friends, or when going somewhere special?

Percentage of time: _____% Comments: _____

_____

_____

_____

14. Have there been any changes since that time in how much (s)he wears the aid? PROBE: Is this about how much the aid is worn now?

1. Changes 2. No changes → GO TO SECTION 16

15. How did it change? FILL IN AS MANY OF THE FOLLOWING SECTIONS AS NECESSARY.

1a. Percentage: _____ % Comments: _____

_____

_____

b. When did this change occur? _____

2a. Percentage: _____% Comments: _____

_____

_____

_____

b. When: _____

3a. Percentage: _____% Comments: _____

_____

_____

_____

b. When: _____

16. When your child first got an aid, how long was it between the time you ordered the aid and the time it was received?

_____

17a. Have you ever had trouble getting aids, either because they were hard to get or because they were so expensive? 1. Yes 2. No

b. IF "YES," What kind of problems have you had? _____

_____

_____

_____

18a. Have you ever received any help in paying for aids? 1. Yes 2. No

b. Did you know that there are places where you can receive financial help? 1. Yes 2. No

(QHH) EDUCATIONAL HISTORY. You said that CHILD enrolled in ( ) school (or program) when (s)he was ( ) years old. BEGIN WITH FIRST PROGRAM NOTED ON PREMAILED QUESTIONNAIRE AND INSURE THAT A FULL DESCRIPTION HAS BEEN OBTAINED.

19a. How helpful do you think the program was to CHILD?... In what way?

_____

_____

_____

_____

b. Were there any other programs available in your area at the time?

1. Yes 2. No

c. IF "YES," What programs were available? _____

_____

Why did you make the choice you did? _____

_____

_____

d. Would you have preferred some other type of program for CHILD at the time? 1. Yes 2. No

e. IF "YES," What would you have preferred? _____

_____

_____

_____

CONTINUE WITH OTHER PROGRAMS TO OBTAIN THE SAME INFORMATION. INCLUDE THE CURRENT PROGRAM.

2a. Evaluation: _____

b. Other programs available: _____

c. Reason for choice (if relevant) _____

_____

d. Preferred alternative: _____

3a. Evaluation: _____

b. Other programs available: _____

c. Reason for choice (if relevant): _____

_____

d. Preferred alternative: _____

4a. Evaluation: _____

b. Other programs available: _____

c. Reason for choice (if relevant) _____

_____

d. Preferred alternative: _____

20a. Do you have any contact with the school or the teacher? PROBE: talking to teacher on phone; attending open house; visiting class.

1. Yes 2. No

b. IF "YES," What type of contact? Who usually initiates it? How often have you ( ) in the past year? FILL IN THE SECTIONS BELOW FOR EACH TYPE.

1a. Type: _____

b. Initiation: _____

c. Frequency: _____

2a. Type: _____

b. Initiation: _____

c. Frequency: _____

3a. Type: _____

b. Initiation: _____

c. Frequency: _____

21a. Has your PARTNER had any contact with the school?

1. Yes 2. No

b. IF "YES," FILL IN AS ABOVE.

1a. Type: _____

b. Initiation: _____

c. Frequency: _____

2a. Type: _____

b. Initiation: _____

c. Frequency: _____

3a. Type: _____

b. Initiation: _____

c. Frequency: _____

COMMUNICATION THE QUESTIONS IN THIS SECTION ARE ASKED ABOUT EACH MEMBER OF THE FAMILY. RECORD ALL ANSWERS ON THE COMMUNICATION TABLE.

22a. Can you tell me now about communication between CHILD and you? How does CHILD communicate to you most of the time? (M1) PROBE: IF RESPONDENT SAYS "SIGNS" OR "FINGERSPELLING", ASK: Does he usually speak as well?

22b. Does (s)he ever communicate to you in any other way? IF "YES", how? (M2)

c. How well do you understand what CHILD attempts to say? RECORD FOR M1 AND M2.

d. How do you usually communicate to CHILD? (M1) PROBE: IF RESPONDENT SAYS, "SIGNS" OR "FINGERSPELLING", ASK: Do you usually speak as well? DEAF PARENTS WHO SIGN: Do you natural signs or the new signs the children learn in school?

e. Do you ever communicate in any other way? IF "YES", how? (M2)

f. How well do you think CHILD usually understands you? RECORD FOR M1 AND M2.

g. Do you ever speak any language other than English at home? SIGNS NOT INCLUDED.

h. How often do you use this second language?

COMMUNICATION TABLE

Question	X	Mom	Mom	X	X	Pop	Pop	X	X	Sib1	Sib1	X	X	Sib2	Sib2	X	X	Sib3	Sib3	X	X	Sib4	Sib4	X
	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
What method used?																								
How well understood?																								
Other language used?																								
How often used?																								

1980

Code

Method
01. Speech
02. Gesture & Pantomime
03. Signs
04. Signs plus speech
05. Signs, speech, & gesture
06. Fingerspelling
07. Fingerspelling plus speech
08. Cued speech
09. Writing
10. Drawing
11. Ameslan

How well understood
1. understands almost everything
2. understands most
3. understands about half
4. understands some, but less than 1/2
5. understands little or nothing

Second language
0. None
1. Italian
2. Portuguese
3. Greek
4. Other European language
5. Other Oriental language
6. Miscellaneous
7. English Dialect
8. French

How often
0. Never
1. Rarely
2. Sometimes
3. About 1/2 of of the time
4. Usually
5. Most or all of the time

PARENT ACTIVITIES

23a. Were you ever enrolled in the John Tracy Clinic Course?

1. Yes 2. No

b. IF "YES," When? _____

For how long? _____

How far did you get? _____

_____

How helpful was it? _____

_____

_____

24a. Is there anything (else) that you have been told to try at home or that you yourself have thought of to help CHILD learn language? PROBES: SPEAKING LOUDER, TALKING TO HIM/HER A LOT. USE OF MANUAL COMMUNICATION IS NOT RECORDED HERE. IF SIGNS ARE MENTIONED, SKIP TO NEXT SECTION AND FILL IN, THEN SAY: Is there anything else you'd like to mention? AND RETURN TO THIS SECTION IF INDICATED.

1. Yes 2. No ⟶ GO TO SECTION 30

b. IF "YES," What have you been doing (told to do)? _____

_____

_____

_____

When did you start? _____

SECTIONS 25 THROUGH 29 ONLY APPLY TO PARENTS WHO HAVE IMPLEMENTED FORMAL LANGUAGE LESSONS IN THE HOME.

25. About how many hours a week do you spend doing this? _____

26a. Is anyone else in the family involved? 1. Yes 2. No

b. IF "YES," Who? _____

Hours? _____

27a. Have you always spent this much time? 1. Yes 2. No.

b. IF "NO," How has the time changed since you began? _____

_____

_____

28a. Have you or your PARTNER had any problems keeping CHILD involved? 1. Yes 2. No

b. IF "YES," What sorts of problems? _____

_____

_____

_____

_____

29a. Have you done (are you doing) anything special to get him/her to cooperate? 1. Yes 2. No.

b. IF "YES," What? _____

_____

_____

_____

30a. Does CHILD like to have books read to him/her? 1. Yes 3. No → GO TO 31

b. How often: 1. Daily
2. Several times a week
3. Once a week
4. Several times a month
5. Once a month or less

c. IF SIGN LANGUAGE USED: Do you have any Signed English books? 1. Yes 2. No

SECTIONS 31 THROUGH 34 ARE FOR HEARING PARENTS WHO USE SOME FORM OF MANUAL COMMUNICATION.

31. When did you start using signs (fingerspelling or cued speech)? _____

32a. Has anyone in the family taken a formal course in ( )? 1. Yes 2. No

b. IF "YES," Who? _____

Where? _____

Total hours of instruction? _____

Type: 1. Signed English
2. Signing Exact English - SEE1
3. Seeing Essential English - SEE2
4. AMESLAN
5. Cued Speech

33a. Did you receive any other type of help in learning to ( )? INCLUDE SELF STUDY. 1. Yes 2. No

b. IF "YES," What? _____

34a. Is there any (other) kind of help you would have liked to have?

1. Yes 2. No

b. IF "YES," What? _____

35a. Since learning of your child's hearing loss, what have been your sources of information about deafness? CIRCLE EACH ONE THAT APPLIES.

1. PAMPHLETS FROM SCHOOL OR CHS
2. MEDIA - TV, RADIO, NEWSPAPERS
3. JOHN TRACY CLINIC COURSE
4. PROFESSONAL MAGAZINES - VOLTA REVIEW, AMERICAN ANNALS, ETC.
5. PROFESSIONAL BOOKS - POLLACK, LING, VERNON, ETC.
6. OTHER _____

b. If "4," Do you subscribe to any magazines or journals? 1. Yes 2. No

36a. Does anyone in the family belong to any organizations concerned with deafness? 1. Yes 2. No

b. IF "YES," Which ones? CIRCLE EACH ONE THAT APPLIES.

1. ONTARIO PARENTS' COUNCIL
2. VOICE FOR HEARING IMPAIRED CHILDREN
3. PARENTS FOR TOTAL COMMUNICATION
4. ALEXANDER GRAHAM BELL ASSOCIATION
5. ONTARIO ASSOCIATION OF THE DEAF
6. CANADIAN ASSOCIATION OF THE DEAF
7. OTHER _____

37a. Have you attended any conferences or meetings on deafness? EXCLUDE ONES PUT ON BY THE SCHOOL. 1. Yes 2. No

b. IF "YES," please describe: _____

_____

_____

_____

_____

SECTIONS 38 AND 39 ARE FOR HEARING PARENTS ONLY.

38a. Do you know any other parents of deaf children? 1. Yes 2. No.

b. IF "YES," Has this been helpful? _____

c. IF "NO," Do you think you might like greater contact with other parents like yourself? 1. Yes 2. No

39a. Do you know any deaf adults? 1. Yes 2. No

b. IF "NO," Do you think you would like to meet some deaf adults?

1. Yes 2. No

Why or why not? _____

_____

_____

c. IF "YES," What kind of contact have you had? _____

_____

_____

Has this helped you in any way? _____

_____

_____

_____

DISCIPLINE

40. We'd like to know about CHILD's general behavior and your way of handling it. First we'll start with some specific things that everyone has to deal with. The first one is toilet training. Do you remember how you trained CHILD? (or: how have you been trying to train child?) _____

_____

_____

41. How did you teach (or how are you teaching) CHILD not to be destructive around the house, for example, not to write on walls, tear books, or deliberately break things? _____

_____

_____

_____

42. Do you remember how you taught(or how have you been teaching) him/her to stay away from things that could be harmful, like a hot stove, iron, or electrical cords? _____

_____

_____

43. How about not running into the street or behind cars?

_____

_____

_____

44a. Does (s)he have definite bedtime hours? 1. Yes 2. No

b. IF "YES," Did you ever have any trouble keeping him/her to this routine? 1. Yes 2. No

IF "YES," How did you handle that? _____

_____

_____

45a. Do you have any special rules in the house about eating?

1. Yes 2. No

b. IF "YES," please describe: _____

_____

_____

_____

How do/did you enforce them? _____

_____

_____

_____

46. Every child gets angry and frustrated at times, maybe deaf children even more so. What does CHILD do when (s)he's feeling this way?

_____

_____

_____

_____

47a. Does (s)he have a temper? 1. Yes 2. No

b. IF "YES," What does (s)he do? _____

_____

_____

_____

How do you handle that? _____

_____

_____

_____

48a. Are there any particular behavior problems you have had with CHILD that we haven't covered? 1. Yes 2. No

b. IF "YES," please describe: _____

_____

_____

_____

How handled? _____

_____

_____

_____

49. In general, compared to other people, do you think of yourself as being very strict, or rather easy going? How would you describe yourself?

1. Much stricter
2. Somewhat stricter
3. About the same
4. Somewhat less strict
5. Much less strict

50. Do you think you are more or less strict with CHILD than with your other children, or is there no difference? OR...Do you think you are more or less strict with CHILD than you would be with any other children you might have? USE ABOVE SCALE.

1 2 3 4 5

51. Do you generally agree with your partner about discipline, or is partner a lot more or less strict than you? USE ABOVE SCALE for partner.

1 2 3 4 5

FAMILY INTERACTION

52. I'd like to discuss how child gets along with other members of the family. First of all, his/her brothers/sisters. What kinds of things do they do together? How often would you say they do this?

FOR EACH ACTIVITY MENTIONED, FILL IN THE FREQUENCY ON THE TABLE BELOW. USE THE REMAINING ACTIVITIES AS PROBES AND FILL IN OTHER ACTIVITIES UNDER 7 and 8. (If more than one sibling, consider them collectively.)

Type	Frequency
1. watch T.V.	_____
2. watch T.V. and interact	_____
3. play (puzzles, games, toys, "rough house", sports)	_____
4. read or look at books	_____
5. help CHILD in daily routines	_____
6. look after CHILD when adults are out	_____
7. _____	_____
8. _____	_____

Code

1. Several times a day
2. Once a day
3. Several times a week
4. Once a week
5. Once or twice a month
6. rarely or never

53a. Sometimes young children feel embarrassed if anyone in their family is different in any way. Do you think your hearing children ever feel that way? 1. Yes 2. No 3. Not applicable

b. IF "YES," How do you handle that? _____

_____

_____

54a. Do you ever feel that they are jealous of the attention CHILD receives because (s)he is deaf? 1. Yes 2. No 3. Not applicable

b. IF "YES," How severe a problem has this been?

1. very severe
2. somewhat severe
3. not at all severe

55a. Do you think that CHILD ever feels left out by the other children?

1. Yes 2. No

b. IF "YES," How serious a problem has this been?

1. very severe
2. somewhat severe
3. Not at all severe

56. Now I'd like to discuss your PARTNER's role in the family and his relationship with CHILD. How often does he:

Type	Frequency
1. watch T.V. with him/her	_____
2. watch T.V. and interact with him/her	_____
3. play with him/her (puzzles, games, toys, "rough house", sports)	_____
4. read to or look at books with him/her	_____
5. help CHILD in daily routines	_____
6. look after CHILD when you are out	_____

Code

1. Several times a day
2. Once a day
3. Several times a week
4. Once a week
5. Once or twice a month
6. rarely or never

57. Does he look after CHILD more or less than the other children (or than he did with them at that age)?

1. Much more with CHILD
2. Somewhat more
3. About the same
4. Somewhat less
5. Much less

58. What about other adults in the family (if any)? Do they treat CHILD at all differently from your other children (or from the way you think they should)? _____

_____

_____

_____

59. How does CHILD get on with your parents?... Do they have him/her over or take him/her on outings the way they do with the others?

_____

_____

_____

_____

60. What about the other grandparents? _____

_____

_____

CONTACT WITH OTHER CHILDREN

61a. How often does your child have contact with children other than siblings?

1. Daily)
2. Several times a week) - Go to 62
3. Once a week
4. Once or twice a month
5. Rarely or never

b. Are there any children available for him (her) to play with?

1. Yes 2. No (explain) _____

_____

_____

ATTITUDES

62. Some people find that having a deaf child changes their lives in important ways. Most of the changes that people talk about are negative, problems that the deafness has created. But people also sometimes mention positive changes that have occurred. I'd like to give you this list and ask you to what extent you think these are true for you. (I'd also like to leave one for your PARTNER to fill out, if you think he wouldn't mind.) The first set lists some possible problem areas, and the second set lists some good things. GIVE LIST TO PARENT TO FILL OUT.

63. Is there anything else that wasn't mentioned? IF "YES," please describe: _____

_____

_____

_____

_____

64. Do you have any suggestions to make that might be helpful to other parents of deaf children?... (Either practical suggestions for looking after them or how you managed to come to terms with the handicap.) _____

_____

_____

_____

_____

_____

_____

INTERVIEW DATA

A. Attitude of Respondent:

1. Extremely uncooperative and/or uncomfortable
2. Somewhat uncooperative and/or uncomfortable
3. Cooperative and reasonably comfortable
4. Very cooperative

Comments: _____

_____

_____

_____

Desired follow-up: _____

_____

_____

_____

B. Was CHILD caressed by respondent during interview, or was affection displayed in any other overt manner?

1. Yes 2. No

C. General attitude of mother toward child:

1. decidedly negative
2. rather cool
3. warm
4. very warm and demonstrative

D. Appearance of home:

1. extremely well ordered
2. well-ordered, but casual
3. appeared somewhat disordered or dirty
4. home showed signs of extreme disorder, disorganization, or lack of cleanliness

E. Economic status:

1. Family appears fairly well-to-do
2. Family appears comfortable, but not particularly well-to-do
3. Family appears not to have too much money, but no essentials are lacking
4. Family appears to have serious economic needs

F. Urban-rural status:

1. rural (low density, limited public transportation, rural roads)
2. suburban - outside city limits, residential
3. central - residential
4. high density inner city areas

G. Type of dwelling:

1. house
2. row housing
3. apartment (low rise)
4. apartment (high rise - more than 5 stories)
5. farm
6. other

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